SCIENTIFIC RESEARCH OF THE SCO COUNTRIES: SYNERGY AND INTEGRATION

上合组织国家的科学研究：协同和一体化

Proceedings of the International Conference

Date: May 19

Beijing, China 2023

上合组织国家的科学研究：协同和一体化
国际会议

参与者的英文报告

International Conference
“Scientific research of the SCO countries: synergy and integration”

2023 年 5 月 19 日，中国北京
May 19, 2023. Beijing, PRC

Proceedings of the International Conference
“Scientific research of the SCO countries: synergy and integration” - Reports in English

(May 19, 2023. Beijing, PRC)

ISBN 978-5-905695-82-7

这些会议文集结合了会议的材料 – 研究论文和科学工作者的论文报告。 它考察了职业化人格的技术和社会学问题。一些文章涉及人格职业化研究问题的理论和方法论方法和原则。
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DOI 10.34660/INF.2023.25.11.186

国家和市政服务控制和监督机构的人员控制
PERSONNEL CONTROLLING IN THE CONTROL AND SUPERVISORY BODIES OF THE STATE AND MUNICIPAL SERVICE

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抽象的。 文章认为人事控制在所有经济领域的管理系统中处于领先地位。对人事控制制度的本质、意义和发展的定义的理论方法进行了讨论。 强调了控制系统在国家和市政服务的控制和监督活动中的特殊重要性。 对国家和市政服务中人事控制系统的发展进行了分析，以便在控制和监督机构的活动中引入有效的人事政策机制。 作为分析的结果，获得了具体结果，并制定了国家和市政服务控制系统的发展方向。 最后，总结了主要结论。 在这项工作中，使用了社会学研究、综合、分析、比较的方法。

关键词：人员监测、控制和监督活动，国家和市政服务。

Abstract. *The article considers personnel controlling as a leading place in the management system in all areas of the economy. A discussion of theoretical approaches to the definition of the essence, significance and development of the personnel controlling system is presented. The special importance of the controlling system in the control and supervisory activities of the state and municipal service is emphasized. An analysis was made of the development of the personnel controlling system in the state and municipal service in order to introduce effective mechanisms for personnel policy in the activities of control and supervisory bodies. As a result of the analysis, concrete results were obtained and directions for the development of the controlling system in the state and municipal service were developed. In conclusion, the main conclusions are summarized. In this work, methods of sociological research, synthesis, analysis, comparison were used.*

Keywords: *personnel monitoring, control and supervision activities, state and municipal service.*

Introduction

Human resources are a key factor in the activity of any economic entity. The personnel controlling system ensures continuous improvement of methods of work with personnel and the use of the achievements of domestic and foreign science and the best production experience. The implementation of the controlling system makes it possible to provide the necessary information to various levels of management at the right time and with high quality, changing the methods of processing economic information based on the use of the latest achievements in the field of computer and microprocessor technology.

At present, in the state and municipal administration, the activities of the control and supervisory nature of the personnel occupies a leading position. In modern Russia, the majority of civil servants belong to the bodies performing the functions of control and supervision, which requires increased attention to the training of managerial personnel, adapted to the combination of managerial knowledge, skills and abilities with legal knowledge of the mechanisms and procedures used in the implementation of state and municipal control and supervision. In this regard, personnel controlling takes the leading place in the management system of the state and municipal service, which is due to the need to increase the efficiency of activities, the search for internal reserves for this. The implementation of the controlling system makes it possible to provide the necessary information to various levels of management at the right time and with high quality, changing the methods of processing economic information based on the use of the latest achievements in the field of computer and microprocessor technology.

The effective development of the personnel controlling system in the control and supervisory bodies of the state and municipal services is of key importance in the issue of success. The introduction of controlling ensures the stability of functioning and the systematic solution of problems that arise as a result of interaction with the internal and external environment.

All this requires leaders to be able to see prospects and make informed strategic decisions. This determined the relevance of the study.

Discussion on research issues.

Controlling is a rather broad concept. In modern economic science, there is no single understanding of controlling. At the same time, everyone agrees that controlling is a management function. In many languages, the word “controlling” is similar in sound to “control”, which sometimes causes associations about the similarity of their content. It is defined by the German economic explanatory dictionary as an observation that allows the administration to identify deviations in

economic processes, find out their causes and predict their further course, which ultimately allows taking measures to ensure the most optimal achievement of the goals set for any organization.

Analyzing the scientific discussion on this issue in the Russian economic literature, we can distinguish several significant periods in its development. First of all, this is the 90s of the XX century, when translated works devoted to controlling were published. For example, in the work "Controlling as a system of thinking and management", controlling is a concept aimed at eliminating "bottlenecks" and oriented towards the future in accordance with the goals and objectives for obtaining certain results (Mayer E., 1993). Or the work of D. Khan, where controlling is understood as a system of integrated information support for planning and controlling the activities of an enterprise. (Didger Khan, 1997).

P. Horvath considers controlling as a subsystem of management that coordinates the subsystems of planning, control and information support, thereby supporting system-forming and system-linking coordination [23].

In the preface to the book "Value-Oriented Concepts of Controlling", M. L. Lukashevich formulated this concept as follows: "Controlling is a holistic concept of economic management of an enterprise, guiding managers to identify all the chances and risks associated with making a profit" [19].

The discussion was activated in the mid-2000s, when controlling from a fashionable trend of the largest Russian corporations gradually began to turn into an actual management tool at the junction of management accounting and, in fact, management. This trend is due to the emergence and development of its own more meaningful theoretical platform, increased competition in sectors of the economy, as isolated as possible from the administrative and bureaucratic intervention of the state, the complication of technical and technological processes, the organizational and economic structure of corporations, and a whole group of derivative factors. A number of domestic works appear.

It is believed that controlling is a system for improving the efficiency of management, preparation, adoption and implementation of management decisions, aimed at achieving the strategic goals of the enterprise, coordinating the activities of departments and services in the process of regulating all elements of managing the course of economic processes based on management accounting, collection, processing and analysis of economic information [4]. N. G. Danilochkina considers controlling as an integrated system for managing an organization, aimed at coordinating the interaction of management systems and monitoring their effectiveness. Controlling can provide information and analytical support for decision-making processes in the management of an organization (enterprise, corporation, public authority) and can be part of prescribing the adoption of certain decisions within certain management systems [10].

Yu. I. Bashkatova offers the following definition of this concept: "Controlling is a complex system that combines management accounting, planning, budgeting, as well as analysis and control of deviations of actual performance from planned ones, support for making optimal management decisions. Controlling is a holistic concept of economic management of an enterprise, which is aimed at identifying all the chances and risks associated with making a profit in market conditions" [6].

A. M. Karminsky interprets controlling as a concept of system management and a way of thinking of managers, which are based on the desire to ensure the long-term effective functioning of the organization. [15].

Thus, as a result of the discussion of the mid-2000s, Russian and foreign scientists formulated the main postulates of the modern philosophy of controlling, which are as follows: the priority of the profitability of the organization's activities over the growth of volume indicators, i.e., the size of the organization, output volumes, the number of branches and customers, product range, balance sheet, etc. are secondary in comparison with the efficiency of the organization as a whole and its divisions; the growth of the organization's business is justified only while maintaining the same level or increasing efficiency; measures to ensure the growth of profitability should not increase the risk levels acceptable for the specific conditions of the functioning of the organization [21].

In modern conditions, social aspects are increasingly emphasized in controlling. Moreover, according to J. Weber, controlling is an element of managing a social system, performing its main function of supporting management in the process of solving the general task of coordinating the management system, with an emphasis primarily on the tasks of planning, monitoring and informing. [9].

With the increasing role of human resources in all areas of activity due to numerous changes in technology and society, the attention of researchers to personnel controlling is increasing. Personnel controlling, according to the authors, is a modern management concept that seeks to meet the new, significantly increased role of human resources in the organization. Personnel controlling is a system of intra-company planning and control in the field of work with human resources, which helps to "transform" strategies into planned values and specific activities, as well as to form the basic provisions for managing the organization's personnel.

An analysis of the available studies allowed the authors to identify the following approaches to the definition of personnel controlling (Table 1)

Table 1

The main approaches to the definition of the concept of "personnel controlling"

Definition of Personnel Controlling	Author
Information-analytical and methodological support for making management decisions in order to improve the efficiency of the organization, in other words, to manage the quality of management.	Horvath P.
Information support system for result-oriented planning, regulation and control (monitoring) processes in the organization, in the performance of integration functions, system organization and coordination.	Khan D.
Management system for the process of achieving the ultimate goals and results of the organization's activities	Mayer E., Mann R.
A complex structure that combines goal setting, planning, accounting, control, analysis and management of information flows and the development of recommendations for making managerial decisions in the field of personnel management	Anankina E.A., Danilochkin S.G., Danilochkina N.G.
The system of information, analytical and methodological support for making high-quality management decisions in the personnel management system in order to increase the efficiency of the organization	Mikhailova A.V.
A system that is an organic unity of interrelated elements (goals, tasks, process, functions, etc.) that form the integrity and quality of a system focused on achieving the goals of effective personnel management in a changing external and internal environment	Sinyavets T.

Thus, summing up the discussion on the definition of personnel controlling, we can state that personnel controlling implies the development and provision of tools to provide factors for increasing labor productivity in an organization.

Controlling as a management tool is a system created to support managers during the development of strategic plans, decision-making, control over all areas of activity.

The main goal is to ensure not only the existence, but also the development of the organization. An advanced controlling system can be used for information collection and analysis, finance, planning, investment, logistics, marketing, etc.

The main task of the personnel controlling system is to provide constant feedback between planning and analysis of plans and deviations from them.

Methods and results of the study.

The basis for the development and implementation of controlling in the control and supervisory bodies of the state and municipal service was the methods of system and process analysis. Using a systematic approach allows the state body to set strategic goals and determine the processes and resources required for the practical implementation of the tasks (functions) assigned to it. The process approach

contributes to the effectiveness and efficiency of the state and municipal body in achieving the intended results; expansion of interrelations and interdependencies between personnel processes; allows you to achieve the intended results, taking into account the effective use of resource opportunities.

In the course of the analysis, it was revealed that the advantages for the introduction and development of controlling in the control and supervisory bodies of the state and municipal service are:

- the ability to consistently and effectively perform supervisory functions and provide services that meet established legal and regulatory requirements;
- creation of opportunities for increasing the satisfaction of consumers of public services;
- directing efforts to the risks and opportunities associated with the environment and the goals of the state and municipal service;
- the ability to demonstrate the compliance of the personnel management system with the requirements in the framework of the priority program "Reform of control and supervisory activities" [3].

Conclusion.

Thus, the introduction and development of personnel controlling in the control and supervisory bodies of the state and municipal services will automate personnel processes through the use of systemic and process approaches. As a result, the quality of personnel work will increase and labor costs will significantly decrease. An improved controlling system will make it possible to monitor compliance with the law in the civil service, including in the field of combating corruption; ensure interdepartmental electronic interaction (the possibility of transferring information in an automated mode); optimize the number of personnel departments of state bodies; reduce management costs.

The introduction of controlling elements into the personnel management system of control and supervisory bodies are additional to the requirements established by law and allow the use of various forms of improving the personnel management system based on the introduction of modern personnel technologies: providing personnel; personnel assessment; professional development of personnel and its organization; motivation and stimulation of personnel, etc.

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DOI 10.34660/INF.2023.80.46.187

中国新能源发展的问题与展望
PROBLEMS AND PROSPECTS FOR THE DEVELOPMENT OF ALTERNATIVE ENERGY IN CHINA

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抽象的。 本文致力于分析中国替代能源发展的前景方向，这些方向可以解决气候变化、能源安全、能源效率等领域的众多问题。在研究过程中，原始文件和二手资料来源 指出了影响我国能源工业发展的主要因素，以及阻碍替代能源利用扩大的问题和矛盾。 基于中国“十四五”发展规划文本，分析了替代能源的主要指标和指南。

关键词：替代能源，中国，能源安全，能源效率，可再生能源，中国十四五规划，“双循环战略”，减排。

Abstract. *The article is devoted to the analysis of promising directions for the alternative energy development in China, which allow solving numerous problems in the field of climate change, energy security, energy efficiency, etc. In the course of the study primary documents and secondary sources the main factors in the development of China's energy industry, as well as problems and contradictions hindering the expansion of the alternative energy resources use have been identified. Based on the text of the PRC 14th Five-Year Development Plan, the main indicators and guidelines for alternative energy are analyzed.*

Keywords: *alternative energy, China, energy security, energy efficiency, renewables, China's 14th five-year plan, "dual circulation strategy", emission reduction.*

High economic growth in China in 2020-2025, predicted by Chinese experts at about 6%, generates additional growth in energy demand. Dynamic development sustentation in order to maintain employment and social stability remains one of the key tasks facing the Chinese leadership for the next five years. At the same time, PRC moves from high-speed growth to high-quality growth (量发展阶段)) due to two factors: increasing domestic consumption and curbing energy demand in energy-intensive sectors of the economy. This is accompanied by China's abandonment of a long-term strategy aimed at expanding foreign economic expansion

and aggressive interception of oil and gas resources in various regions, and at the same time moving to a model of stimulating internal investment and consumer demand, which involves the effective integration of domestic and international markets ("dual circulation"), that is internal and external market forces in order to achieve sustainable development. This model is called the "double circulation strategy" [1, p.52].

By 2021, the 100th anniversary of the CCP, China has completed the construction of a moderately prosperous society (小康), raising to $10,000 GDP per capita and moved on to comprehensively building a modernized socialist state based on the concept of an innovative, "green", open and inclusive development, while placing more emphasis on improving the quality and efficiency of economic growth. This is partly why, for the first time in history, in the new 14 five-year development plan, the Chinese government did not set specific indicators for GDP growth.

Two other goals are no less relevant – achieving "carbon neutrality" by 2060 as part of the energy transition and climate policy and maintaining the highest possible level of self-sufficiency in domestic energy supplies. While in the short term China's growing energy demand can be met by fossil fuels[1], in the long term other factors will play a key role: technological innovation, renewable energy sources (Renewables)[2], energy storage and carbon capture systems, and also changes in human behavior and business practices. It should be noted that the self-sufficiency in energy supply and maintaining the dominant position of state-owned enterprises in the PRC energy sector are in conflict with the market forces action and the goals of achieving climate neutrality [2, p.9].

Let us clarify that the energy transition strategy developed in the *"Below 2°C"* scenario of the *China Renewable Energy Outlook 2019 (CREO 2019)* assumes the progressive development of Chinese energy in three main areas: 1) improving energy efficiency; 2) electrification and market reforms, involving a change in the rules of the game and the displacement of fossil fuels from final consumption, and 3) "green" energy supply, based on the introduction of "clean" technologies, reducing energy production costs and large-scale growth of clean energy due to expanding the renewable energy use. The main "drivers" of this strategy contain:

– continuous development of Renewables, including after the gradual abolition of their subsidies;
– control over the production and consumption of coal as the main source of China's environmental problems and greenhouse gas (GHG) emissions;

[1] Note. Fossil fuels are various carbon-based fuels extracted from hydrocarbon fossil fuel deposits such as oil, natural gas, coal and peat.

[2] Note. The IEA defines «renewable energy» as « hydro , geothermal, solar, wind and tidal/wave/ocean energy, and the use of these forms of energy to generate electricity and heat, as well as solid biofuels , liquid biofuels and biogases.

- strong policy for the implementation of energy efficiency measures;
- energy market reforms aimed at increasing efficiency and making electricity a cost-competitive energy carrier for most consumers;
- increasing the flexibility of the energy system through its decentralization;
- implementation of an effective carbon control policy [3].

The development of alternative energy in the PRC is regulated by a number of legal documents, like the Renewable Energy Law (February 2005), the New Editions of the Renewable Energy Law (2009 and 2014), the Golden Sun Program (support for photovoltaic Energy), China Manufacturing 2025 Initiative (May 2015), an annual White Paper (latest issue in 2023 *"China 's Green Development in the New Era"*), five-year development plans, long-term energy development forecasts, and related official documents adopted by the PRC under the Paris Climate Agreement - *Action Plan for Carbon Peak Emissions to 2030* (October 2021), C*hina's Zero Emissions Strategy 2050, Operational Guidelines for Achieving Carbon Peaking* and *Carbon Neutrality with Full and Conscientious Implementation of the New Development Philosophy* ("1+N Policy Framework", October 2021), etc.

China sees the renewable energy development as a way to simultaneously achieve various goals, including: reducing pollution and emissions; growth of public welfare; reducing dependence on fossil fuels; achieving world leadership in the production of equipment for the renewable energy generation. One of the key goals of the *13th Five-Year Plan* (2016-2020) was the creation of a "clean, low-carbon, safe and efficient energy system." *Deep Mitigation Scenario 2022* presents various energy decarbonization strategies, including energy efficiency, electrification, fuel switching and direct use of renewable energy [4, p.23].

Let's analyze various aspects of China's alternative energy during the implementation of the *14th Five-Year Plan program* (2021-2025) in such areas of energy policy development as: 1) reducing GHG emissions and achieving carbon neutrality; 2) reduction of energy intensity; 3) diversification of Renewables; 4) building nuclear power. According to the five-year period plans there will be a demand increase for all types of energy sources, except coal. At the same time, natural gas and renewable energy consumption will increase most rapidly [5, p.6]. Thus, alternative energy, understood as a set of promising methods for obtaining, storing, transmitting and using energy (as a rule, from renewable sources which low risk of causing environment harm), will become one of the main directions for the Chinese energy development in the coming years.

1. Reducing pollution and emissions

China is the absolute leader in GHG emissions and the main emitter of energy-driven CO2 emissions. It accounts for more than 30% of global emissions from fossil fuels, more than the combined emissions of the EU and the US. China's

energy sector, based on fossil fuels, is responsible for 90% of all GHG emissions in the country. As recommended by the *IPCC*, increasing the use of renewable energy, combined with an aggressive strategy for increasing energy efficiency, is the most realistic way to reduce emissions as soon as possible (estimated to halve by 2030). Only through the introduction of renewable energy global emissions can be reduced by 25% by 2050 [6].

As part of the *Paris Climate Agreement* (2015), China committed itself to reducing the carbon intensity of GDP by 60-65% compared to 2005 and increase the share of non-fossil fuels in the structure of primary energy consumption up to 20%. In accordance with these obligations, it will have to reduce emissions (CO2) by 13-14 bn tons by 2030. As part of the *13th Five-Year Plan*, China planned to invest $361 bn in renewable energy, which will annually reduce carbon dioxide (CO2) emissions by 1.4 bn tons, sulfur dioxide – by 10 m. tons, nitrogen oxide – by 4.3 m. tons, smoke and dust – by 5.8 m. tons, as well as reduce the consumption of water resources by 3.8 bn cubic meters [3].

In the long term 2020-2050 (Fig. 1.) energy-related CO2 emissions by economic sector in the *Deep Mitigation Scenario*[3] in the PRC industry are reduced by 77% (while remaining the predominant source of CO2 emissions); transport-related emissions will decrease by 74%; emissions from the highly electrified buildings sector – to near zero levels; in agriculture – by 70%.

It should be noted that during the period of the 12th and 13th five-year plans, China failed to reduce GHG emissions. And this is despite the fact that in 2020 more than half of all new renewable energy capacities in the world were installed in China (136 GW), and in 2021 more than 100 GW of wind and solar power plants were commissioned in the country. At the same time, CO2 emissions increased by 500 m. tons. Most electricity is still generated by burning fossil fuels. China continues to commission a significant amount of coal-fired power plants (more than 70% of global capacity in 2020), which will contribute to an increase in CO2 emissions.

[3] Note. Deep Mitigation Scenario Mitigation Scenario), introduced in China Energy Outlook 2022, as opposed to the Continuous Improvement Scenario (Continuous improvement Scenario) assumes that China will fully develop and implement deep decarbonization technologies, methods and behavioral changes, including technologies in pilot or demonstration stages, in order to reduce GHG emissions as much as technically possible by 2050, including large-scale deployment of capture technologies, use and storage of carbon.

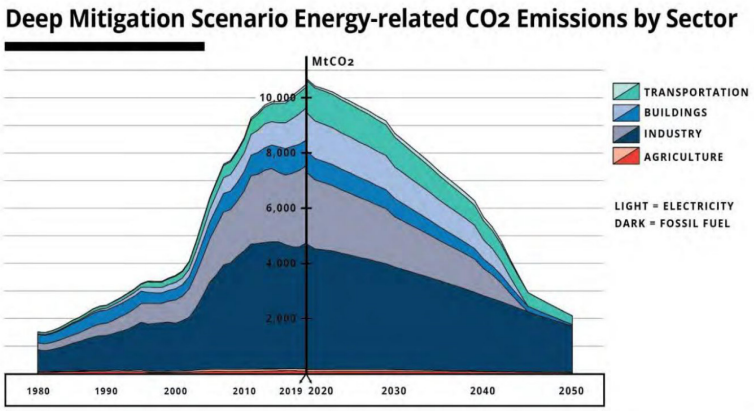

Figure 1. *Energy-Related CO2 Emissions by Sector in the PRC Deep Mitigation Scenario, 2020-2050, MtCO2*

Source: China Energy Outlook 2022; 1980-2019: National Bureau of Statistics of the People's Republic of China; IPCC , 2006.

In 2021-2025 GHG emissions per unit of GDP should be reduced by 18%. The control of the carbon emissions intensity will be complemented by the control of total pollutant emissions, which tend to decrease. Plans introduce idea of "CO2 emission cap" [7]. CO2 emissions will peak around 2030 at around 10.5 bn tons. In order to achieve the goals of carbon neutrality, it is planned to introduce a national emissions trading system (ETS) during the 14th period of the five-year plan, while so far only pilot projects have been operating in the country in seven regions of the country, covering about 3 thousand enterprises [1, p.135]. In June 2021, China decided to remove subsidies for new solar and onshore wind farms, as the cost of technology fell and investments in the renewable energy sector began to pay off without government support. The development of renewable energy will be stimulated through IPOs financing, green bonds, green trusts and special carbon-neutral funds. The ongoing state policy will lead to the fact that the share of coal in the country's energy balance will decrease from 57% to 50% by 2025, the contribution of oil will be 18%, gas –10%, non-fossil – about 20% including nuclear power plants, which corresponds to PRC's obligations under the Paris Agreement [5, p.6]. Experts understand that achieving the common goal of limiting global temperature rise to 1.5°C without the participation of China is not possible. At the same time, according to the *Deep Mitigation Scenario* slowing down the reduction of CO2 emissions will begin only after the full decarbonization of the energy system, which will occur in 2045. Therefore, emissions in 2060 will

exceed 1 Gt CO2, mainly due to the use of oil and coal for shipping and aviation, cement and chemicals production, oil refining and energy supply processes.

2. Reducing energy intensity

China has made great strides in improving energy efficiency over the past three decades, reducing the energy intensity of the economy by 70% between 1990 and 2018, twice as much as the global average [8, p.22]. In the *14th Five-Year Plan*, the PRC also sets the task of reducing excess energy consumption and increasing the efficiency of its use, but does not set specific figures for energy consumption, defining a reduction in energy consumption per unit of GDP in this period by 13.5 %. At the same time, as mentioned above, there are no targets for GDP. In the long-term forecast, the beginning of the decline in final energy consumption is expected from the 2030s. In order to achieve the necessary reduction in energy intensity, cumulative structural changes affecting energy, heavy industry, transport, construction, land use, etc. are needed. However, modernization cannot happen all at once and requires huge technical and financial investments, including energy storage. This can be achieved by strengthening the energy system regulation and ensuring technological transformation aimed at improving energy efficiency, as well as through the development and revision of mandatory national standards for energy consumption and energy efficiency of products and equipment [9, p.88-98].

3. Diversification of renewables

In 2021, the total installed capacity of renewables in China reached 1,063 kW, which is more than one third of the total renewable energy generation capacity in the world and 44.8% of China [8, p.25]. The volume of installed capacities for the use of water, wind and solar energy at the beginning of 2023 exceeds 300 GW for each type and is the highest in the world. In addition to these sources, the country is developing bioenergy, the use of swamp gas, geothermal energy, tidal energy.

The government pays great attention to the issues of «green» energy, which is due to the need to form a strategy for sustainable development, taking into account environmental protection. The development of environmentally friendly alternatives in the field of energy supply will help effectively reduce the country's dependence on oil and gas and ensure energy security. Currently, the main problems in the world oil market arise due to an imbalance in supply and demand, which in turn is associated with the emergence of new types of oil resources, including shale oil. The problem of formation of an equilibrium market price and its correspondence to the current costs of oil production in various regions is also important. World prices for «black gold» tend to increase in connection with the implementation of the Agreement on the oil production reduction by the OPEC countries from January 1, 2017. Weakly predictable processes are taking place in the global gas market, causing increased price volatility in regional markets, which is a consequence (among other things) of the shale gas development in the United States and geopolitical instability.

In general, the problem of energy security in the world is due to the growing asymmetry and polarization of natural fuel and energy resources, both in terms of their uneven occurrence, and the territorial mismatch between production and consumption areas, which forms the dependence of consumer countries on producer and exporter of energy resources [10, p.10]. One of the main long-term risks of the world energy industry is the lack of investments in the conventional energy sources development and the unjustified redistribution of investments in favor of renewable energy projects [11, p.55]. All this directly concerns the Chinese fuel and energy complex development. With the expansion of its economic potential and demand for energy resources, the intensity of their supply in the economy increases many times over. Therefore, at present, the problems of security of supplying oil and gas resources to the PRC economy are quite acute and become a key challenge [1, pp.16-60].

By the start of the implementation of the 14th Five-Year Plan (2021), the installed solar power capacity in China was 250 GW. The rapid increase in its generation becomes possible due to the development of technologies for the production of polysilicon and silicon wafers, solar cells and modules. During the 14th Five-Year Plan, the average annual domestic installed capacity of solar power plants may increase by 90 GW. The installed wind energy capacity was 280 GW. The need to develop wind energy is considered as a key direction among all types of green energy, since it is wind generation that is the safest and most environmentally friendly. However, the lack of equipment and spare parts for the offshore structures installation remains a significant obstacle in this area. This is explained by the complexity of the technologies and long supply chains.

China aims to increase the share of non-fossil fuels in its primary energy consumption from 15% in 2020 to 25% by 2030 and to 80% by 2060. During the 14th Five-Year Plan, this figure could increase from 15.6% to 20%. As part of this goal, the total installed capacity of solar photovoltaic systems and wind turbines will be increased to 1,200 GW by 2030. It should be noted that the renewable energy cost has fallen sharply in China over the past decade. Thus, the weighted average installation price for onshore wind projects fell by 16%, utility-scale solar photovoltaic projects – by 84% [8, p.25].

Hydrogen energy is a dynamically developing industry in China and should receive a new impetus in the coming years, becoming one of the main “green” forms of energy. China’s contribution to the 120 m. tons of current hydrogen world production is 33 m. tons, or more than a quarter. However, this production is almost entirely based on fossil fuels, but by 2050 already 27% of the generating capacity will produce environmentally friendly (“green”) hydrogen [8, p.36]. According to the goals published in the China *“White Paper on Hydrogen Energy and Fuel Cells 2020”*, the share of hydrogen fuel in China’s energy mix will be

increased to 20% by 2060. At the same time, there are concerns about its safety and exploitation, as well as significant additional energy costs for its production. Experts note that China, as a major producer of metallurgical and chemical products, will also become a major consumer of hydrogen and, at the same time, a supplier of electrolyzes to other countries. Two factors contribute to this: China already is a major producer of electrolyzes (e.g. *PERIC Corporation*) and it has low capital costs.

4. Development of nuclear energy

Nuclear power in China is considered one of the alternative energy types, and at present the government is showing increased interest in it. This is primarily due to the fact that it is the alternatives to coal, and the excessive use of it is a serious problem. In 2011-2019 the share of nuclear energy in total electricity generation increased from 1.85% to 4.9% (up to 348.1 TWh, or 0.1 of the world's nuclear energy generation). According to the speed of nuclear energy development, China occupies a leading position in the world. In 2021 the country operated 49 nuclear power units, with 17 – under construction. China ranks third after the USA and France in both total installed nuclear capacity and generated energy. By 2025, it is planned to increase the installed nuclear power plants capacity from 52 GW to 70 GW and, under favorable circumstances, to 180 GW by 2035. China places particular emphasis on the development of nuclear power plants key components, the possibilities of using new materials, etc. It is also planned to build several waste processing plants activities of nuclear power plants, development and promotion of relevant Chinese technologies of the new generation [2, pp.20-23].

5. Forecasts

It should be mentioned that in the long term (2020-2050) Chinese experts' assessments of the non-fossil fuels role in energy consumption differ significantly. In early scenarios (e.g., *"Below 2°C" CREO* 2019), the PRC increases their share in total energy consumption from 11% to 58%, while reducing the share of coal from 56% to 11% in an almost mirror image. The share of non-fuel generation in the electric power industry, taking into account nuclear power plants, will be more than 90%. In the *Continuous Improvement* and *Deep Mitigation* scenarios, carbon neutrality is not achieved by 2060 (emissions will be 4.8 Gt CO2 and 2.1 Gt CO2, respectively). In the first of these scenarios, the share of non-fossil energy sources is set at 55%, which is significantly below the adopted target of 80%; it is also expected to increase the share of oil from 21% to 24%. In the second case, the target level of non-fossil fuel use is reached almost a decade earlier (by 2050), the share of coal and oil in primary energy consumption is reduced to 8% and 14%, respectively [4, p. iv].

Conclusions

In the coming decades, hydrocarbons will remain the main source of energy both in the world and in the Chinese economy. However, the study revealed that

alternative energy will become one of the main directions for the Chinese energy development in the coming years, and China considers the expansion of the renewable energy sources use as a way to achieve a number of different socio-economic tasks, including maintaining energy security, increasing the energy efficiency, adapting to changes climate, improving the environment, achieving technological leadership and high-quality development, etc.

At the same time, China continues to put into operation a large amount of coal-fired power plants in order to maintain economic growth, which is a restraining factors for reducing greenhouse gas emissions. A significant barrier to the development of wind generation in China is the lack of equipment for offshore structures. At the same time, China has managed to eliminate subsidies for new onshore wind and solar power plants, significantly increasing the payback of renewable energy projects. Experts predict that China has every chance of becoming not only a major consumer of such as promising type of fuel as hydrogen energy like, but also a supplier of equipment for its production to the world market. In the development of nuclear energy, special emphasis is placed on the key components of nuclear power plants development, the possibilities of using new materials, waste processing, as well as related new generation technologies taking into account the scale of the economy and energy consumption of this country. The study confirms the conclusion of *A.M. Mastepanov* that the PRC's policy in the field of alternative energy is one of the factors of uncertainty in the world energy industry development and will affect the mining industry in Russia [3].

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DOI 10.34660/INF.2023.69.30.188
UDC 338.242.2

经济制裁背景下俄罗斯联邦运输综合体的安全

SECURITY OF THE TRANSPORT COMPLEX OF THE RUSSIAN FEDERATION IN THE CONTEXT OF ECONOMIC SANCTIONS

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注解。本文中的研究允许比较评估运输运输发展中创新过程强化的相互关系，今天这在很大程度上决定了各个区域领土和民族国家经济发展效率的主要参数。

研究的主题是资源成分在空间和时间上移动的运输参数对区域生产环节的效率和竞争力以及经济实体贸易关系组织的扩展。 资源及其地域分散和碎片化程度以及适应生产力和能力的可能性，如今在很大程度上决定了制造业需求的发展以及储备参数对商业效率和经济竞争力的影响 民族国家。 特别关注外部州际和内部国家线性运输网络的发展，包括铁路、公路和水路运输。

积极发展俄罗斯“南北”、“西东”运输走廊的努力证实了本出版物的相关性，这对于利用俄罗斯巨大的资源潜力共同发展先进企业具有重要意义 具有现代化生产和人员能力的友好国家工业。 这项研究的科学基础是综合分析和估计专家评估效果的复杂方法。

文章结果科学论证的主要目标参数有：

- 确认可以利用亚洲发达国家先进企业的做法，这些做法基于货物交付速度和制造业库存量最小化对劳动生产率的影响，并因此对集约增长产生影响 区域经济发展效率。
- 通过企业参与全球运输联系的创新发展，证实俄罗斯和亚洲地区国家一体化进程的重要性，这将通过积极发展参与国的通信来刺激经济集约化 组织原材料和适销产品的运输。

这项工作的科学新颖性取决于在当前制裁压力和全球市场重新定位的情况下，俄罗斯和亚洲国家运输系统一体化发展的必要性。

假设是交通干线的现代化将作为提高劳动生产率和为国家生产潜力创造创新交通支持的基础，不仅通过向西方和亚洲供应原材料的碳氢化合物成分，而且通过企业参与 在国际业务中发展国家高效的运输基础设施。

关键词：交通基础设施； 企业参与国际业务； 国家各地区的创新发展； 运输和生产综合体的效率； 内部基础设施潜力； 运输劳动生产率； 国际运输合作； 加强运输走廊的使用； 运输创新项目； 新的世界秩序。

Annotation. *The studies in this article allow a comparative assessment of the interrelations of the intensification of innovative processes in the development of transport transportation, which today largely determine the main parameters of the efficiency of the development of the economy of the respective regional territories and national states.*

The subject of the study *is the transport parameters of the movement of the resource component in space and time on the efficiency and competitiveness of the production link of the regions and the expansion of the organization of trade relations of economic entities. Resources, the level of their territorial dispersion and fragmentation with the possibility of accommodating productive forces and capacities, are today largely determining in the development of the needs of the manufacturing sector and the impact of reserve parameters on business efficiency and the competitiveness of the economies of national states. Particular attention is paid to the development of both external interstate and internal national linear transport networks, including rail, road and water transport.*

The relevance of this publication *is confirmed by the search for the active development of the transport corridors of Russia "North-South", "West-East", which will be important in using the huge Russian resource potential in the joint development of corporate advanced industries of national friendly states with modern production and personnel capabilities. The scientific basis of this study is the complex methods of analysis of generalization and estimated expert assessments of the effect.*

The main target parameters *of the scientific substantiation of the results of the article are:*

• Confirmation of the possibility of using the practice of advanced enterprises in developed Asian countries based on the impact of the speed of delivery of goods and minimizing the volume of inventories in the manufacturing sector, on labor productivity and, as a result, on intensive growth in the efficiency of regional economic development.

• Substantiation of the importance of the integration processes of Russia and the countries of the Asian region through corporate participation in the global innovative development of transport links, which will stimulate the intensification

of the economy through the active development of communications of the participating countries in the organization of transportation of raw materials and marketable products.

***The scientific novelty** of the work is determined by the rationale for the need for an integrated development of the transport system in Russia and Asian countries, in the current conditions of sanctions pressure and the reorientation of global markets.*

***The hypothesis is that the modernization of transport arteries** will serve as the basis for increasing labor productivity and creating innovative transport support for the country's production potential not only through the supply of the hydrocarbon component of raw materials to the West and Asia, but through corporate participation in the development of the country's efficient transport infrastructure in the international business.*

***Keywords:** Transport infrastructure; Corporate participation in international business; Innovative development of the regions of the country; Efficiency of the transport and production complex; Internal infrastructure potential; Labor productivity in transport; International transport cooperation; Intensification of the use of transport corridors; Innovative projects in transport; New world order.*

Introduction

Despite the current sanctions pressure of European countries on Russia, which have the goal of introducing a complete disruption of the domestic economy, there is a need for scientific substantiation of the issues of adequate opposition to sanctions and the search for ways to develop the country's economy by improving the transport infrastructure and corporate development of the transport and manufacturing business in Asia, Africa and Latin America. Reliance on the fact that sanctions that affect the reduction of the trade balance of the countries participating in international cooperation, as well as the reduction of foreign exchange sources of the formation of the budget will put Russia in a dead end, which is obvious and unlikely.

The reduction of world reserves of hydrocarbon raw materials, as well as the aggravated possibility of its production and supply, as well as the catastrophic reduction of world hydrocarbon reserves, require an urgent solution to the problems of finding alternative sources for the development of the economies of most states based on the development of new areas of international business. Such areas, in our opinion, can be nuclear energy as an alternative source of energy, for which Russia has elements of a monopoly and new forms of organizing international corporate business based on the corporatization of transport and production systems with the effective use of the existing production and personnel international potential.

One of these priority areas is the transport system of Russia, which is a link between Asia, Europe and Africa. It is the transport infrastructure today that determines the effectiveness of many production processes and national systems that play a significant role in the creation of the gross domestic product.

Infrastructural innovations in the transport sector make the production process of a number of countries more competitive, efficient, optimized in terms of financial costs and time.

Based on the foregoing, it should be noted that the role of the organizational innovation component in transport is also important in attracting interested corporate clients in joint participation in the development of joint transnational transport and production systems.

The location of modern production facilities in Asia, India, China, as well as the availability of personnel of appropriate qualifications, require rapprochement with sales markets, which must be territorially accessible, with minimal transport costs delivered to the consumer in Europe, Russia and the Baltic countries. In addition, this is also the basis for increasing the mobility of labor resources between the states participating in the transport and production corporate systems, as well as within the participating states, which will create an opportunity to increase labor productivity.

In this case, a relatively inexpensive mode of transport that unites the territories of states is international and domestic road, rail and water transport, which have received a new round of development in recent years. Also, the southern and northern sea routes, as well as the emerging combined transport corridor, an alternative to the Silk Road through the Caspian Sea from the Mediterranean with the construction of the Caspian-Black Sea Canal.

For these purposes, it is possible to use water and rail transport all year round with the use of innovative types of icebreakers and modern hovercraft. [1]

The purpose of this scientific article is to identify the dependence of the growth in the efficiency of transport systems as a factor in reducing transnational costs in organizing the production of regional and international corporate systems on the introduction of innovations in the organization of combined transportation by road, rail, sea and river transport. [2]

To achieve this goal, the authors have identified the following tasks:

1. Determination of the estimated methodological base for establishing complex dependencies between the transportation of resources to the place of their processing and the logistics costs of the operation of transport systems in promoting goods to markets.

2. Study of the dynamics of trade turnover of interstate commercial cooperation in relation to the dynamics of the development of logistics systems and transport security of mutual deliveries of goods of a wide range of consumption.

3. Determination of the volumes of inter-country transportation of China and Russia by all modes of transport for the last reporting period, some of which are a potential reference point for the development of the transport network of friendly states of Asia and the Russian Federation.

4. Determination the possibility of a comprehensive expert assessment of the pace of development of the economies of the countries participating in the corporate development of transport systems.

The concept of innovation in transport was considered by the authors in monographs and publications from previous scientific papers [2-6], where this concept is defined as an innovative vision or evaluative innovation based on the use of corporate formation of transnational logistics systems with new information and communication technologies for design and cargo escort using modern technical solutions, which allows both to increase the efficiency of business processes and improve the economic and time parameters for the provision of high-quality transport services.

In addition, the authors substantiate the possibility of obtaining a multiplier effect in the development of roadside business infrastructure in both small towns and public-private partnerships as a result of the implementation of large-scale transport development projects of the participating countries [3].

The study of foreign sources suggests that they consider the Asian-European transport supply of goods through the formation of a large-tonnage sea container transport complex, which actively affects the transaction costs of transportation, but recently more and more scientific attention has been paid to high-speed modes of transport such as , railway, road and river transport, including the integrated use of the logistical advantages of the created direct transport corridors between Asia and Europe, affecting a number of states included in the network to ensure the operation of the new corporate transport systems being created.

The authors consider transport logistics business systems and innovations in the transport sector mainly as a tool for improving economic security [4], including from the point of view of the efficiency of using geographic and communication opportunities, as well as corporate financing for the formation of transport systems.[5]

Problems and prospects for the development of corporate transport systems will expand the opportunities for external and internal labor migration, which today for Russia is one of the deterrents for ensuring expanded reproduction due to a shortage of professional personnel in high-tech industries. These aspects are studied in detail by both domestic scientists [6-7-8] and foreign ones [9], as a rule, from the standpoint of replenishing the missing production force in large cities and the corresponding demographic decline in the periphery.

It is no secret that recently the problem of the effectiveness of introducing innovations in the transport sector as a factor in the efficiency of the use of labor resources in the countries of Asia and Russia remains little studied, and there are still no clear justifications and research works in the direction of investment in human capital and the growth of labor productivity in the economy. At the same time, the possibility of effective access to high-tech jobs located in industrial centers for labor resources living in remote settlements, which eliminates the problem of the decline in the able-bodied population on the periphery of Russia, since ensuring the mobility of labor resources through the development of innovative transport systems and transport corridors makes it possible to use labor force without changing the place of residence, tk. increases the speed of movement of labor resources with a relatively large shoulder for moving people from their places of residence to their place of work [10].

Therefore, the authors substantiate the position of a direct dependence of the growth of labor productivity in the territories when implementing innovations in the transport sector.

Scientific methods

As a scientific apparatus of research, the authors used various methods of analysis, statistical observation, as well as methods of abstraction, generalization, scientific assumption and mathematical modeling.

The sources for the analysis of data on the studied indicators were

Internet resources of Rosstat (rosstat.gov.ru), State Reporting of the People's Republic of China and the Ministry of Transport of the Russian Federation (mintrans.gov.ru).

An analysis of these statistical data shows that there is an imbalance between the Russian production potential and the corresponding territorial economic needs for labor resources in a number of regions of Russia, which is not observed in modern China. In addition, the labor resources themselves, with the necessary qualifications, are scattered on a territorial basis, inconsistent with the needs and availability of production factors. For example, the imbalance of production and resource potential, which requires the organization of internal labor migration between the constituent entities of the Russian Federation, can be assessed according to the graph shown in Fig. No. 1.

Figure 1. *The structure of internal labor migration by sectors of the economy (types of economic activity)*

Table 1

The headcount of employees and the need of organizations for employees to fill vacant jobs by professional groups as of December 31, 2022

Total for surveyed activities			
	List number of employees - total, people	*The need for workers to fill vacancies, people*	*The share of the need for workers to fill vacancies in the total number of jobs, in %*
Total specialists	**26445178**	**1029853**	**3,5**
Leaders	22775337	49057	2,0
Specialists of the highest qualification level (in the field of science and technology, healthcare, education, administration, culture, sports, information and telecommunication technologies, etc.)	74056977	254088	3,1
Medium-level specialists (in the field of science and technology, healthcare, education, administration, culture, sports, information and telecommunication technologies, etc.)	3058066	119078	3,5

Employees involved in the preparation and execution of documentation, accounting and maintenance	1256548	45185	3,3
Workers in the service sector and trade, protection of citizens and property	2439278	136671	5,5
Skilled workers in agriculture and forestry, fish farming and fisheries	186015	9373	4,5
Skilled workers in industry, construction, transport and related occupations	3634299	179268	4,8
including in the field of construction	740862	52979	6,4
in the field of metalworking and mechanical engineering	1630398	60331	3,5
in the field of electrical engineering and electronics	668342	32818	4,7
in the field of food, woodworking, textile and clothing industries and workers of related occupations	550131	31665	5,3
Plant and machine operators, assemblers and drivers	3423438	124359	3,6
Unskilled workers	2764635	112748	4,9

At the same time, the number of the missing qualified labor force, as well as its share in the structure of employees determined to fill vacant jobs in the total number of jobs as of December 31, 2022, according to Rosstat (rosstat.gov.ru) is as follows (Table 1) .

The analysis shows that the total need for personnel in the country is more than 1.0 million people, the average share of jobs is more than 3.8%. At the same time, the highest need for skilled workers is observed in the industrial sector (in particular, in the field of mechanical engineering and metalworking), construction and transport, which amounts to 179 thousand people, which will determine the specific weight of the need in the total number of jobs of about 5.0% .

Statistical data confirm the problems of imbalance in Russia regarding the territorial mismatch of production capacities in the provision of labor resources, which leads to unloaded productive forces and capacities, which has a tremendous impact on the slowdown in the development of territories due to low labor productivity.

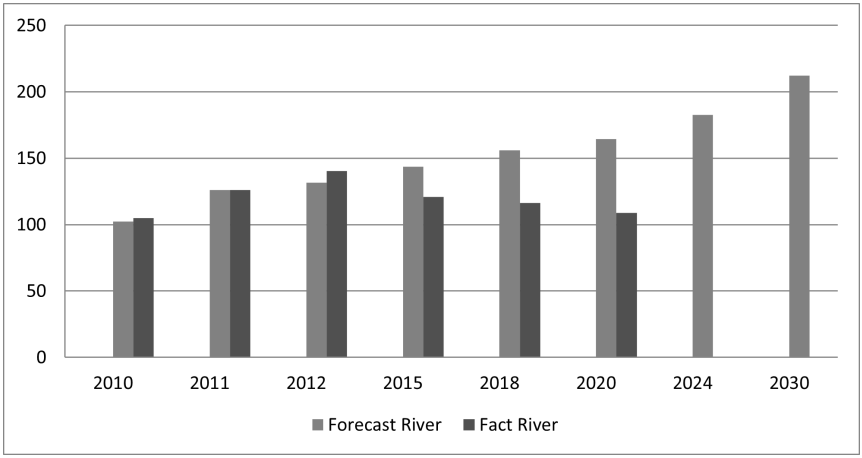
A strategic assessment of the possibility of creating a new transport route «North-South» and the possible creation of an integrated trans-Asian - Iranian-Caspian canal, including eastern and western branches, will significantly increase the

competitiveness of transport transportation in the macroeconomic space. At the same time, the western branch through the Iranian-Azerbaijani vector provides for the inclusion of a shoulder of road transport through the city of Reshat. The vector of the transport system of the eastern direction includes a route channel from China and India through Kazakhstan and Turkmenistan, while this complex includes rail transport, which, in the logistics complex, provides for transportation by water transport from Russia to Iran. Such a logistics route, including the Iranian component of the route, will use the port of Bandar Abbas.

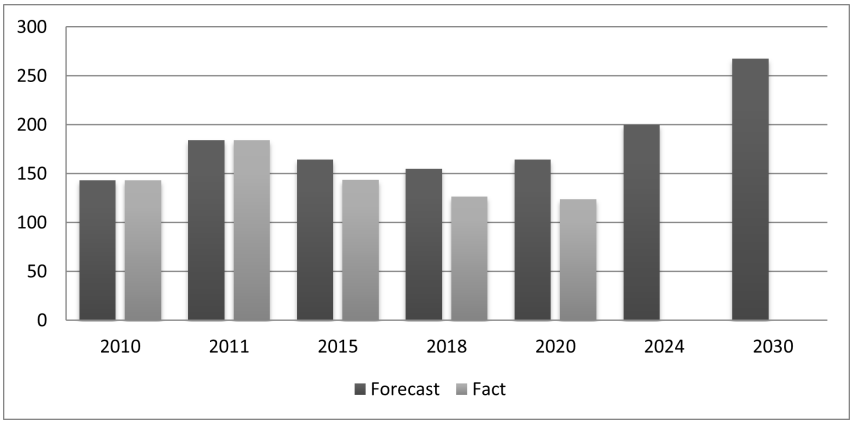
In the current conditions of the developing reorganization of the world order, which limits the dominance of Euro-American relations, this route can become the most important component of cargo transportation from Europe. This route is shorter when competing cargo transportation from India and Latin America to the European part. [10-11].

The Transport Development Strategy of the Russian Federation for the period up to 2030 provides for measures to increase the dynamics of development of the unified transport system of the European part of the Russian Federation. Innovative organizational solutions and measures to increase labor productivity that form the basis for the intensive development of transport, the implementation of which would lead to an increase in traffic in the European basins by 2.2 times by 2030 compared to 2010, including transit cargo along the ITC «Northern South». However, the volume of cargo transportation and the volume of their processing in logistics processing centers and ports of water transport after 2010, as the analysis shows, tends to decrease. For example, its share in the total traffic volume in 2022 was only 1.7%. [12].

Developed and approved by the Federal project «Inland Waterways» only through the construction of the Volga and Donskoy (Nizhny Novgorod and Bogaevsky) low-pressure hydroelectric facilities, it was planned to increase the throughput capacity of inland waterways by 36.6 and 19 million tons, respectively. However, the construction of hydroelectric facilities has so far been postponed for a strategic perspective development of transport routes in accordance with the development of transnational projects implemented by China and Russia. [13]



Forecast and actual indicators of cargo transportation and handling in ports



Forecast of the volume of transportation and processing in ports by inland water transport according to the basic version of the strategy and its implementation Source: according to the information and statistical bulletin Transport of Russia and [14]

Of the entire list of strategic government documents in the field of transport, the most important in relation to the international project «North-South» is the «Strategy for the development of Russian seaports in the Caspian basin, rail and road approaches to them in the period up to 2030». [13-14]

The document notes that cooperation between Russia and Asian countries, including India and China, in the Caspian-Black Sea territorial sector could be more effective and create the necessary conditions for increasing the throughput of cargo flows through Russia.

Scientific Findings

Despite the development of trade between Russia, China and Iran, the share of «Asian tigers» in Russian trade remains only about 3%. At the same time, raw material exports from Russia exceed imports from China and Iran by more than four. The problem of participation of China and India in the transport corridor is that the main trading partners of India are still China, the USA and the UAE and the countries of Europe. They account for about 40% of all foreign trade between India and China. The share of Russia in the foreign trade of India and China, as well as the share of India in the foreign trade of Russia, is at the level of 1-2%.

In the future, in order to increase trade turnover, as a return loading to the ports of India, China and Iran, it is planned to supply hydrocarbon raw materials, timber products and food resources, including agricultural grain and livestock products from the South of Russia and the North Caucasus Federal District.

The implementation of the envisaged measures has become the basis for the development of the Black Sea terminals of grain loading and oil loading new complexes, and it is also planned to build a new deep sea port in the city of Kaspiysk by 2025. For this, a total reorganization of the accompanying infrastructure is expected: railway and automobile approaches, storage facilities.

Financing the construction of the Kavkaz ports on Taman and the Kerch port facilities enhances the role of developing a promising corridor for commodity exchange with Turkey, the Mediterranean Latin American states, including African states, with which Russia is actively establishing trade relations today.

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DOI 10.34660/INF.2023.56.88.189

国家社会政策以及国家和市政部门组织的活动
SOCIAL POLICY OF THE STATE AND ACTIVITIES OF ORGANIZATIONS OF THE STATE AND MUNICIPAL SECTOR

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抽象的。 社会正在发生的变化，难以预测的情况，涵盖所有国家的领土和人口，需要考虑社会政策的内容、其主体的作用及其影响的程度。 俄罗斯国家为公民过上体面的生活创造条件。 为此，建立社会保障和标准，确定相关活动的资金来源。 俄罗斯社会导向型经济的形成涉及寻找满足人民社会需求的方式和机制。 因此，有必要在经济现代化的框架下考虑国家社会政策的发展。 公共部门组织为民众的利益开展活动。 为此，组织形成信息系统，允许以简化的形式查找有关可能的社会支持措施的信息并获得适当的帮助。

关键词：社会政策、社会保护、保障、社会服务、公共部门组织。 社会政策、社会保护、保障、社会服务、公共部门组织。

Abstract. *The changes taking place in society, difficult to predict circumstances, covering the territories and population of all countries, require consideration of the content of social policy, the role of its subjects, and the extent of their influence. The Russian state creates conditions for citizens for a decent life. To do this, social guarantees and standards are established, sources of funding for relevant activities are determined. The formation of a socially oriented economy in Russia involves the search for ways and mechanisms to meet the social needs of the population. Therefore, it is necessary to consider the development of the social policy of the state in the framework of the modernization of the economy. Public sector organizations carry out their activities in the interests of the population. To this end, organizations form information systems that allow in a simplified form to find out information about possible measures of social support and receive appropriate assistance.*

Keywords*: social policy, social protection, guarantees, social services, public sector organizations. social policy, social protection, guarantees, social services, public sector organizations.*

Article 7 of the Constitution of the Russian Federation states that the Russian Federation is a social state whose policy is aimed at creating conditions that ensure a decent life and free development of a person. [1]

In the Russian Federation, labor and health of people are protected, a guaranteed minimum wage is established, state support is provided for the family, motherhood, fatherhood and childhood, disabled and elderly citizens, a system of social services is being developed, state pensions, benefits and other guarantees of social protection are being established. [1]

In order to achieve the norms specified in the normative acts, the state pursues a social policy aimed at establishing a system of economic relations between the state, social groups and citizens. To this end, an appropriate institutional environment is being formed, consisting of public authorities and institutions providing social services.

In Russia, social policy began to operate on a state scale at the very beginning of the 20th century.

The role of modern state social policy is expressed in the functions that it performs:

1) ensuring social security, which is implemented through the support of the social rights of citizens of the state through programs of integrated socio-economic development;

2) social protection of the population, aimed at minimizing social risks in certain life situations through social payments.

Principles of social policy in Russia:

1) social solidarity;

2) social partnership;

3) social compensation;

4) social guarantees;

5) social support.

The provision of social protection in Russia is carried out by the public administration sector, which includes state authorities and relevant institutions. [2]

Within the framework of the current legislation, the concept of "organizations of the public sector" has been replaced by "organizations of the public sector", which are understood as state (municipal) institutions, state bodies, local governments, local administrations, management bodies of state non-budgetary funds of the Russian Federation and territorial state non-budgetary funds. [3]

The study of social policy is influenced by processes taking place on a global scale, such as, for example, the pandemic caused by the COVID-19 disease. This situation has seriously affected the social sphere of life of citizens of each state. Having touched the economic sphere, the pandemic exacerbated the global socio-economic crisis, which was caused by mass unemployment and a decrease in in-

comes of the population. Governments of all countries were forced to respond quickly to this situation. Thus, from March to October 2020, 1414 measures of social protection of the population were implemented in 215 countries of the world. [4]

The significance of the state social policy is to mitigate inequality in the distribution of income of economic entities, as well as to resolve disputes that arise between participants in economic activity. And, as the current situation shows, social policy should reflect the reaction of the authorities to unforeseen natural phenomena and conflicts between states, supporting their own population. Accordingly, an effective social policy will make it possible to make the transition to full-fledged market relations and the economy's recovery from the crisis. [5]

In order to implement by the state pension provision, compulsory pension insurance, compulsory social insurance in case of temporary disability and in connection with motherhood, compulsory social insurance against industrial accidents and occupational diseases, social security, provision of social protection measures to certain categories of citizens, in Russia with Since 2023, the united state non-budgetary Fund for Pension and Social Insurance of the Russian Federation - the Social Fund of Russia - has been operating. [6]

Since 2022, the Social Fund of Russia has been providing separate support measures that were previously provided by the social protection authorities. Services are transferred to the Social Fund of Russia automatically. Those who are already receiving payments do not need to go anywhere to reissue them and continue to receive funds. If benefits have not yet been issued, starting from 2022, you need to apply for them at the territorial offices of the Social Fund of Russia. The conditions for providing social support measures remain the same.

A unified state information system for social services has been created in Russia, which allows citizens, state authorities, local governments, organizations providing social support and social services, to obtain complete information about the measures of social support and social services, social payments and guarantees provided to citizens at the expense of funds of the federal budget, budgets of subjects of the Russian Federation and local budgets. The objectives of this information system are:

- accounting and analysis of social expenses of state institutions;
- maintaining a classifier of social protection measures;
- informing citizens about social protection measures.

The information system allows authorities to generate analytical and statistical data and reports. Citizens can receive personalized information about the provided social protection measures through the personal account of a citizen.

However, social problems remain. To solve them, the following social state programs have been formed and are being implemented in the Russian Federation:

1) development of health care - the goals of state policy in the field of saving the people of Russia and developing human potential are sustainable natural growth in the number and improvement of the quality of life of the population, strengthening the health of citizens;

2) development of education - in order to increase the availability, efficiency and quality of education in accordance with the realities of the present and the challenges of the future;

3) social support of citizens - goals: improving the well-being of citizens and reducing poverty; modernization and development of the social services sector in the field of social services; ensuring sustainable natural growth of the population of the Russian Federation; increasing life expectancy to 78 years by 2030; ensuring the availability of high quality social services for all needy elderly and disabled citizens through the further development of a network of organizations of various organizational and legal forms and forms of ownership that provide social services; development of the sector of non-governmental non-profit organizations in the provision of social services by creating a mechanism for involving them on a competitive basis in the implementation of the state order for the provision of social services, creating a transparent and competitive system of state support for non-governmental non-profit organizations providing social services to the population, developing interaction between the state, the population, business and civil society structures; improving the system of providing state and municipal services to citizens;

4) accessible environment - goal: creation of legal, economic and institutional conditions that promote the integration of persons with disabilities into society and improve their standard of living;

5) providing affordable and comfortable housing and public utilities for citizens of the Russian Federation - goals: increasing the annual volume of housing commissioning to 120 million square meters. meters by 2030; improvement of living conditions by 2030 for at least 5 million families; resettlement until 2024 8.9 million sq. meters of housing stock recognized as uninhabitable as of January 1, 2017; increase in one and a half times the comfort of the urban environment by 2030; ensuring the quality and accessibility of housing and communal services by 2030 to at least 50 percent of the population;

6) promotion of employment of the population - goals: not to exceed by 2030 the value of the registered unemployment rate of more than 1 percent; creating conditions for the formation of a culture of safe work and increasing the effectiveness of measures aimed at preserving the life and health of workers in the course of work;

7) the development of culture - the goal: the formation of a harmoniously developed personality and strengthening the unity of Russian society through priority cultural and humanitarian development.

It can be concluded that in the Russian Federation all conditions have been created for the implementation of an effective social policy that allow the population to fulfill their needs in the framework of life, as well as various business entities in their activities. The objects of social policy must be sure that in the event of any unfavorable situation, both in the life of an individual and the state as a whole, opportunities will be provided to maintain a certain level of functioning and even development. However, it is necessary to develop a set of measures that allow the state to maintain an appropriate level of social support and its development, as well as provide for possible situations that lead to a deterioration in the social situation in the state. In order to bring the concept of "social policy" into a single format, it is necessary to develop a set or code of normative acts that establish a clear concept, types, mechanisms and principles for the implementation of state social policy.

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DOI 10.34660/INF.2023.87.87.190

中俄跨境电子商务挑战与对策研究
RESEARCH ON THE CHALLENGES AND COUNTERMEASURES OF CROSS-BORDER E-COMMERCE BETWEEN CHINA AND RUSSIA

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Abstract. *With the deepening development of China-Russia strategic cooperative partnership, cross-border e-commerce trade between China and Russia has become a new trend in economic and trade cooperation between the two countries. However, in the new development stage, China-Russia cross-border e-commerce also faces some problems, such as imperfect logistics system and payment system, and risks in settlement. Based on these problems, this paper proposes solutions from improving the logistics system and payment system and preventing settlement risks to promote the healthy and good development of Sino-Russian trade.*

Keywords: *cross-border trade, regional economy, cross-border e-commerce, China-Russia trade, e-commerce.*

Overview of cross-border e-commerce in China

Cross-border e-commerce refers to an international business activity in which transaction subjects belonging to different customs borders reach transactions through e-commerce platforms, make electronic payment settlements, and deliver goods through cross-border e-commerce logistics and off-site warehousing, thus completing the transactions.

According to data from the General Administration of Customs of China, bilateral trade between Russia and China reached a record high of $110.76 billion (excluding trade in services) in 2019, with an increase of 3.4%. Russian exports to China reached $61.05 billion, up 3.2% year-on-year, and Russian imports from China totaled $49.7 billion, up 3.6% year-on-year. 2010 was the first year when

China became Russia's largest trading partner. According to the agreement between the heads of the two countries, bilateral trade will be increased to $200 billion by 2024, as well as investments in Russia will be increased to $12 billion [1]. According to a report by the Chinese government, the annual cross-border e-commerce import and export volume (including B2B) in 2022 was 2.11 trillion yuan, up 9.8% year-on-year. Among them, exports were 1.55 trillion yuan, up 11.7% year-on-year [2]. Meanwhile, China's policies are encouraging the development of cross-border e-commerce. The Outline of the Fourteenth Five-Year Plan of the National Economic and Social Development of the People's Republic of China and Vision 2035: Planning for the High-Quality Development of Foreign Trade, released by the Chinese Ministry of Commerce, states that innovation-driven promotion of high-quality development of foreign trade is needed to accelerate the development of new trade patterns and promote the sustainable and healthy development of cross-border e-commerce. The digitization of the economy will continue to grow, with the digital economy increasing from 7.8% of GDP in 2020 to 10% in 2025 [3], and will also support the development of technologies such as cloud computing, big data, the Internet (including the Internet of Things and industrial Internet), and blockchain. Compared with traditional forms of trade, cross-border e-commerce can be sufficient to break the time and space constraints, reduce the intermediate links of trade, and provide new development opportunities for multiple countries, regions, and enterprises around the world.

Problems of cross-border e-commerce between China and Russia

Nowadays, the development of cross-border e-commerce trade between China and Russia is developing in a good trend, but new problems have also emerged in the development of cross-border e-commerce between China and Russia, which are elaborated as follows.

Poor infrastructure connection. The transportation infrastructure in the Russian Far Eastern Federal District is poorly modernized, which restricts the local economic development and the improvement of residents' living standards. Although the density of railroad and road networks is higher than the average in the Far East, and there is relatively well-developed air transport, Russia also suffers from insufficient capacity and high transportation costs. Due to Russia's vast territory and large east-west span, it makes its domestic logistics market relatively fragmented, which also brings certain difficulties to the logistics distribution of cross-border goods. Among them, postal service, as the most common distribution logistics, takes mostly 3 days in cross-border e-commerce logistics and 10 days for customs clearance in China and Russia, which will lead to an extended delivery period when the cross-border goods purchased by consumers enter the domestic distribution stage, thus affecting consumers' consumption experience. Compared with Russia, China has well-developed transportation and convenient

external connections, but there are also problems of inadequate supporting facilities and low transportation efficiency. The transportation network between China and Russia cannot be effectively docked, which affects the transit transportation capacity along the Sino-Russian border.

The cross-border payment system in China-Russia cross-border e-commerce needs to be further improved. The existing cross-border payment system can hardly guarantee the efficiency, convenience and security of transactions, while the exchange fluctuations of the currencies of the two countries also bring certain risks of cross-border e-commerce settlement and payment. In addition, the construction of relevant laws and regulations on cross-border e-commerce in China and Russia is not perfect, and the business environment of cross-border e-commerce needs to be improved.

Countermeasures for the cross-border trade between China and Russia

Based on the above problems in Sino-Russian trade, this article proposes several countermeasure strategies, which are elaborated as follows:

Strengthen the linkage of facilities. China and Russia should make full use of the support of Silk Road Fund, ADB and BRICS Development Bank to strengthen cross-border infrastructure and infrastructure construction in their respective regions. Strengthen cooperation in the construction of transportation infrastructure along the Russian-Chinese border. At the same time, we should strengthen the construction of logistics networks in the border areas of both countries and improve the level of interconnection. Through the construction of the Northern Sea Route and the construction projects of “Binhai 1” and “Binhai 2” [4], the Russian-Chinese border can be made a part of the international transport corridor, and the transport infrastructure in the border area can be modernized actively to take over part of the freight traffic from the Northern Sea Route. The project will strengthen the connection with the Eurasian economic hinterland through the northern sea route, and open up a wider market space for economic and trade cooperation between Russia and China.

Increase the investment in mobile payment technologies. For enterprises, China and Russia can introduce independent third-party payment companies or online payment tools in the field of cross-border e-commerce, so that transactions and payments between the two sides can be guaranteed and timeliness can be taken into account. For consumers, improving the portability of cross-border transactions can increase the volume of transactions to a certain extent, such as quick payment, net banking payment, etc. The success rate of cross-border e-commerce transactions can be greatly improved by verifying the identity of the transaction user, bank card and cell phone number and other information to realize the quick binding of bank card and e-commerce payment system. New payment technologies such as one-click payment and fingerprint payment can also be borrowed to

realize the convenience of cross-border e-commerce transactions and increase the participation rate of consumers in cross-border trade [5].

Develop digital trade. China and Russia should actively create a good ecology conducive to the development of digital trade, build a digital trade platform conducive to the development of small trade in the border areas of the two regions, increase people's willingness to participate in digital trade, and accelerate the exploration and development of a digital trade development program in the border areas of China and Russia.

Conclusion

China and Russia should seize the opportunity of the times for the new trade model of cross-border e-commerce, give full play to the advantages of cross-border e-commerce, deepen international economic and trade cooperation, and promote the sustainable development of cross-border trade between China and Russia.

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DOI 10.34660/INF.2023.88.74.191

高科技公司的管理工具
MANAGEMENT TOOLS FOR HIGH-TECH COMPANIES

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抽象的。 随着世界国际经济一体化，高新技术企业国际化发展是必然趋势，但高新技术企业国际化发展面临严峻挑战。 在外部环境方面，高科技国际化企业面临复杂的国际市场环境，包括不断变化的政治经济环境和不同的法律法规；在内部控制方面，高科技企业存在组织结构简单、沟通困难等管理问题 ，以及高科技公司内部缺乏创新能力。 本文通过应用组织管理工具、控制、沟通和创新对中国高新技术企业进行分析，认为要发展高新技术企业的国际竞争优势，必须因地制宜，采用不同的管理工具。 应根据不同的环境条件来发展企业的国际化水平。

关键词：高科技公司，管理工具，国际化，创新，公司内部控制。

Abstract. *With the world international economy integration, high-tech companies internationalization development is an inevitable trend, but the high-tech enterprises internationalization development faces serious challenges. In terms of external environment, high-tech internationalized companies face complex international market environment, including changing political and economic environment and different laws and regulations, and in internal control terms, high-tech companies have management problems such as simple organizational structure, communication difficulties, and lack of innovation ability within high-tech companies. This paper analyzes Chinese high-tech enterprises by applying organization management tools, control, communication, and innovation, and argues that to develop the international competitive advantage of high-tech enterprises, the enterprises must be adjusted to the actual situation, and different management tools should be used to develop the enterprises internationalization level according to different environmental conditions.*

Keywords: *high-tech companies, management tools, internationalization, innovation, internal corporate control.*

High-tech enterprises are different from general traditional manufacturing enterprises. As a carrier of scientific and technological innovation, high-tech enterprises are characterized by high investment, high risk, high talent and high profitability. Improving the enterprises management tools is the key to the high-tech enterprises international development, which is of great significance in realizing the strategic objectives of enterprises, preserving and increasing the value of assets, legal compliance of operation and true and complete information, and is also a requirement for realizing the high-tech companies international development.

The high-tech enterprises environment is divided into internal environment and external environment, which is the basic surface for the construction of internal control and is the premise for integrating enterprise strategy, development force cohesion and ensuring the internal control execution effectiveness. The external environment is mainly influenced by the cross-action of macro policies and external market on enterprise operation. High-tech enterprises in the external market under the fierce competition, the national macro policy regulation is more to adapt, the enterprise's own subjective initiative is smaller. Therefore, high-tech enterprises mainly need to adapt to the policy changes, economy and international situation externally, while internally they need to update their management forms, develop their innovation ability and improve their internationalization[1].

There are many management tools for high-tech enterprises, and this paper mainly analyzes the organization, internal control, innovation ability and high technology enterprises communication ability. First of all, the analysis of the organization of high-tech enterprises, the high-tech enterprises development in terms of the organization to implement a flat, decentralized organizational structure, scientific organizational structure and its responsibility allocation, power checks and balances mechanism is the key part of the enterprise management environment construction, the business purpose is to achieve its overall goal, the high-tech enterprises advantages is in the continuous exploration and pursuit of new knowledge and new things. In the enterprises international development, the enterprises international competitive environment is very fierce. The flat organizational structure can greatly shorten the decision-making time frame, enhance the decision-making efficiency and win the time for the development of enterprises.

Secondly, it is the high-tech companies internal control analysis. The enterprises internal control activities refer to the ensuring process that enterprises control objectives of are achieved through risk assessment, identifying and analyzing risks, and taking a series of targeted control measures to control all kinds of risks faced by enterprises in the business course within tolerable limits. Enterprises

need to develop various systems and business processes are the organizational part of the control activities, which involves the entire process from design to implementation. First of all, risk assessment is needed, risk assessment is the premise of targeted development and implementation of control activities, the design of control activities rely on the risk assessment results, so the high-tech enterprises control activities should also be designed according to the internal and external risks faced by their own enterprises[2]. Then, sales management control is needed, and enterprises should carry out irregular inspection and analysis based on customers comprehensive consideration, markets, product performance, etc., to identify weaknesses in sales control as early as possible to avoid adverse effects on the achievement of sales targets. Finally, high-tech enterprises need to consider factors such as customer creditworthiness that should be of concern to general enterprises, and should also try to shorten the credit period or eliminate the credit period strategy to enhance of corporate cash flow robustness .

Third, it is necessary to analyze the high-tech enterprises innovation ability. Innovation is the power source for the high-tech enterprises sustainable development, and it is the fundamental for their survival and development, and the innovation development should run through the enterprise development whole life cycle. In order to ensure the status of new technology, new materials, new technology and other innovative factors in high-tech enterprises, the fields that enterprises focus on and the products they produce all have high technological content, especially in the early stage of R&D, because they are not skilled in technology, the R&D team needs to explore continuously. According to statistics, the general R&D investment intensity of high-tech enterprises is between 5%-15%, and the high one can reach 50%. In its R&D results transformation stage, more investment is needed, generally up to 5-10 times of R&D investment intensity. So in the face of such a situation need to carry out innovation content and funds and balance analysis, according to market demand, combined with the enterprise's own product positioning, scientific organization of R & D tasks, strengthen the R & D control of the whole process management, standardize the R & D process, clarify intellectual property rights, to ensure the R & D process orderly development, promote the effective R & D results transformation, to achieve the enterprise R & D goals[3].

Finally, the high-tech enterprises information and communication, the internal control of enterprises effective implementation depends on the efficient and information accurate transmission, the information transmission involving all business management aspects, to ensure such information effective transmission at all levels within the enterprise, between the enterprise and the outside, the correct use and timely communication, is the enterprise information and communication process. The information communicated includes rules and regulations, financial

data, information technology construction, anti-fraud mechanism, etc. Meanwhile, we should pay attention to the setting of confidentiality mechanism in the communication process to ensure that the different secret levels information is passed to those who have the right to obtain it. high-tech enterprises information and smooth and efficient internal communication are not only helpful for managers to grasp the organization development status in time and improve the scientific level of decision-making, but also help to improve the organization efficiency and the collaboration level, which has an important role in achieving corporate performance goals[4]. Strengthening external communication is an important part of enterprise information communication. Along with the increasingly refined division of labor in the market, the business engaged in by an enterprise is unlikely to involve the product whole life cycle, and the enterprise cannot exist in the market in isolation. Compared with traditional enterprises, high-tech enterprises face more external uncertainties and need to strengthen their communication with external markets, customers, suppliers and governments.

Conclusion

With the world economy continuous development and science and technology, the high-tech companies internationalization road is developing rapidly and has an important impact on our production life. Now countries continue to develop 5G, cloud computing, artificial intelligence, biomedicine and other high-tech fields, high-tech companies in although there are some problems on the international development road, but now still in the continuous development and improvement process, through the enterprises organization, communication, innovation, internal control and other management tools to develop the high-tech enterprises internationalization level , so as to achieve the national comprehensive strength development.

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DOI 10.34660/INF.2023.64.53.192

论研究型大学的特点及其在创新设计领域与企业和国家互动的主要形式
ON THE FEATURES OF RESEARCH UNIVERSITIES AND THE MAIN FORMS OF THEIR INTERACTION WITH BUSINESS AND THE STATE IN THE FIELD OF INNOVATIVE DESIGN

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抽象的。 对现代世界流行的“研究型大学”模式发展趋势的广泛来源进行了系统化。 在此基础上，给出了作者对“研究型大学”的概念和特征的界定； 对研究型大学与企业之间两种主要合作形式的主要区别特征以及优缺点进行了比较：地名并组织为联合体，作为大学与创新企业的合作形式。

关键词：研究型大学，研究所，学术互动的网络形式，硅谷，研究成果商业化，科教中心，地名。

Abstract. *The systematization of a wide range of sources on the development trends of the “research university” model, popular in the modern world, has been carried out. On this basis, the author’s definition of the concept and features of a “research university” is given; a comparison of the main distinguishing features, as well as the strengths and weaknesses of the two main forms of collaboration between research universities and business was made: the network model in its varieties, such as research centers (complexes), organized in the form of toponyms and organized as consortiums as forms of cooperation universities with innovative business.*

Keywords: *research university, research institute, network form of academic interaction, Silicon Valley, commercialization of research results, scientific and educational center, toponym.*

Scientific publications note that: “In the last two centuries, several leading philosophical and sociological paradigms of university knowledge and education have changed, namely: D. Bell (the university as the main social institution of society), W. Humboldt (the research university model - knowledge as a science , “education through science”), M. Heidegger (knowledge as an event through which a person takes root in the people and connects with his destiny) [1], K. Mannheim (the concept of mass society and the theory of the

superiority of intellectuals in cultural and political sense), X. Ortega y Gasset (knowledge as a culture, university education - familiarization with the meanings of life), V. Rogue (university as a product and image of time), J. Newman (the concept of an ideal university in which the image of a free person is cultivated), " [2] etc.[1] As for modern trends in understanding the concept of universities and university education, there is also a change in university philosophy. The reasons for this are, first of all: the information revolution that started in 1960, the scientific and technological revolution, the beginning of which is associated with 2000. Experts also point out that the reason for the "new reality in education is also connected with the" cultural revolution of the late 1960s-1970s. in the West", which, in particular, is changing the research culture.

For the practical implementation of the concept of a research university, the question is relevant: how can a new concept of university science be implemented in them: on the basis of organizational mergers of universities with research institutes, with the formation of a single scientific and educational complex, or a new legal entity; or on the basis of the concept of functional interaction of universities through a network form of association with the preservation of the organizational independence of each of the institutions? In the latter case, it should obviously be taken into account that the factor of dependence of the research institute on the profile departmental affiliation is not excluded, which in specific cases may exclude the possibility of merging the center of education and the center of science.[2] The definition of the term «research university» is multidimensional, it consists of such characteristics as: that it is a functional association (the unity of educational and research institutions); that "the most important distinguishing features of research universities are the ability to generate knowledge, transfer it effectively to the economy"[3]; that "the goal of research universities is to train personnel capable of doing research in the priority areas of the innovation economy."[4] The following characteristic of a research university is also proposed: "association and interaction of educational, scientific organizations, officially fixed cooperation with enterprises"[5].

A number of specialists, characterizing a research university, identify it primarily with such a form of educational activity as a network model. So V.G. Khalin and E.M. Korostyshevskaya distinguish between traditional models for

[1] Research Universities// https://bstudy.net/715309/sotsiologiya/issledovatelskie_universitety

[2] Academicians urged to take into account the opinion of scientists when deciding on the merger of research institutes and universities // https://nauka.tass.ru/nauka/13584377

[3] Salimyanova I. G. The role of research universities in the development of the national innovation system//file:///C:/Users/Zhanna/Downloads/rol-issledovatelskih-universitetov-v

[4] Salimyanova I. G. The role of research universities in the development of the national innovation system // Ibid.

[5] Consortiums: a fashionable trend for the university environment or a clearly articulated need?

ensuring the development of the Russian economy and the network model. At the same time, they refer to the traditional form of the linear form of implementation of innovative processes, which implies, when implementing innovative processes in the economy, "strict linkage of successive stages of work", however, initially begins with scientific research[6] and a parallel form, in which "the beginning of the innovation process is not so tightly tied to science, but can be associated with other phenomena, depending on the characteristics of innovation processes."[7] The third model is characterized by the named authors as "a new promising structure that originated in the 1990s in the USA in the largest world-class technopolis "Silicon Valley". It is characterized by a concentration of small innovative firms operating in the newest sectors of the economy around research universities and centers. The network model can be defined as a model of the innovation process that is adequate to the information economy. The first stage of the network innovation process consists of fundamental research conducted in a free style, without a special organizational structure, by trial and error by students and professors of Stanford University. It is these studies that give rise to new high-tech firms, the mass formation of which constitutes the second stage of the innovation process. A characteristic feature of this model is venture business, venture capital, integrating innovation and investment and focusing on the efficient use of the intellectual resource of leading research universities"[8].

In practice, network forms of interaction between universities, research institutes and practice in the modern world are widely represented in the form of scientific and educational centers (complexes) organized in the form of toponyms - analogues of Silicon Valley in California (USA). startup: "Since the "real" Silicon Valley in California got its name and worldwide fame, many in other countries of the world began to try to repeat its success. In the 90s and "zero" years, "silicon" toponyms arose like mushrooms after rain. Silicon Hills in Austin, Texas (1995). Silicon plateau in Bangalore, India (1999). Silicon Oasis in Dubai, UAE (2003). Silicon Cape in Cape Town, South Africa (2009). In Great Britain alone there are Silicon Corridor, Silicon Bypass, Silicon Gorge, Silicon Glen (Scottish narrow valley) and even Silicon Fen near Cambridge. To date, the list of "silicon" toponyms has dozens of names around the globe" [9]. According to the definitions in

[6] Khalin V.G. and Korostyshevskaya E.M. Education and innovation. Research Universities: World Experience.// Innovations. 2005. No. 7 (84). p.78

[7] Khalin V.G. and Korostyshevskaya E.M. Decree. Work. P. 78

[8] Khalin V.G. and Korostyshevskaya E.M. Decree. Work. P. 79

[9] Zhongguancun: how China's «silicon valley» looks like and how it was bornhttps://habr.com/ru/companies/ruvds/articles/673284/ Erwinmal According to the definitions in the science of linguistics, "a toponym is the name of a geographical object (rivers, deserts, mountains, cities, villages, villages, etc.), officially recorded in documents and fixed by time", the word "toponym" means that "a stable historical and cultural naming characteristic of a particular locality// D. Petrov. What are toponyms and toponymy.// https://ktonanovenkogo.ru/

the science of linguistics, “a toponym is the name of a geographical object (rivers, deserts, mountains, cities, villages, villages, etc.), officially recorded in documents and fixed by time”, the word “toponym” means that “a stable historical and cultural naming characteristic of a particular locality// D. Petrov. What are toponyms and toponymy.// https://ktonanovenkogo.ru/]. In China, “one of the first — and most successful — silicon projects was the Zhongguancun Science and Technology Park in Beijing. It is he who is most often called the “Chinese silicon valley”, and there are many reasons for this. Moreover, he weightily claims the honorary title of the second most important «silicon» hub on the planet. At least as of the early 2020s.[10]

We consider it acceptable to introduce the term «toponym» into the conceptual apparatus of pedagogical science and the science of educational law in connection with the peculiarities of the territorial organization of the interaction between university science and practice. [11]

In addition, an integral part of the process of integrating science and practice according to the model of such entities as «Silicon Valley» is the process of commercialization of the results of scientific research. In practice-oriented publications, the following consultation of the algorithms of this process is given: “The commercialization of innovations is the attraction of investors to finance the implementation of this innovation on the basis of participation in future profits if successful. At the same time, the process of bringing an innovative project to the market is a key stage of innovative activity, after which (bringing to the market) the costs of the developer (or owner) of the innovative product are reimbursed and they receive profit from their activities. The process of bringing an innovative project to the market includes several stages:

1. If an enterprise has several projects, then to enter the market it is necessary to select projects that have commercial potential and a high degree of readiness for development. In addition, important assessments of projects are: market demand, potential payback period, profitability, risks.

2. Formation of financial resources. Usually, the company does not have or does not have enough own funds. In this case, it is necessary to attract investors.

3. Fixing the rights to the project and distribution between the participants.

4. Introduction of innovation into the production process or organization of production of innovation with its subsequent refinement, if necessary”[12].

[10] Zhongguancun: how China’s «silicon valley» looks like and how it was bornhttps://habr.com/ru/companies/ruvds/articles/673284/Erwinmal June 25, at 13:00

[11] According to the definitions in the science of linguistics, “a toponym is the name of a geographical object (rivers, deserts, mountains, cities, villages, villages, etc.), officially recorded in documents and fixed by time”, the word “toponym” means that “a stable historical and cultural naming characteristic of a particular locality// D. Petrov. What are toponyms and toponymy.// https://ktonanovenkogo.ru/

[12] See, for example: Musinova Z. Commercialization of innovations.// http://futureaccess.ru/Medaicenter/biznes-stati/cominnovation/

The American experience of Silicon Valley is undeniably impressive. However, in our opinion, the extremely quick and unexpected bankruptcy of Silicon Valley Bank, along with two other US banks (Silvergate and Signature Bank) with assets exceeding $300 billion (for three banks, 2023) showed the weaknesses of organizing an innovative business related to with the IT industry and the high-tech sector during periods of financial and economic instability of the state.

In Russia, some analogues of such territorially defined scientific centers - toponyms, according to our estimates, are «Skolkovo» and, in some part of its features - «Sirius», each of which relies on a separate federal law on the status of the relevant organization[13].

Since the beginning of 2000 In Russia, discussions began on the collaboration of business with universities in the form of creating consortiums as the main form of cooperation between innovative business and universities. The Russian scientific literature notes that such new forms of "cooperation between the industrial sector, scientific organizations and other participants for the joint achievement of common goals" as a consortium have become widespread in the world for a number of reasons, the key of which is the need to introduce and actively use tools for accelerated scientific research. -technological development of countries. ... These associations imply the emergence of a concentration of material and intellectual resources, which necessitates the creation of special mechanisms to avoid the abuse of market power, since the basic instruments of private law are not enough."[14] The uniqueness of consortiums is also considered to be the sign that "this mechanism is optimal for achieving such goals as creating innovations, searching for new markets or significant modernization of existing ones"[15]. At the same time, attention is also drawn to the disadvantages of this form, since "the creation of consortiums increases systemic risks, threatening the development of small and medium-sized businesses and limiting competition."[16] As for the prevalence of consortiums in foreign countries, according to publications in the Russian scientific literature, in the United States "in the 1980s. a number of legislative acts were adopted to stimulate the association of companies seeking to support

[13] Federal Law No. 244-FZ of September 28, 2010 «On the Skolkovo Innovation Center» (as amended); Federal Law No. 437-FZ of December 22, 2020 «On the Sirius Federal Territory» (as amended and supplemented)

[14] Vitol E.Yu., Tyulyaev G.S. Relevance of the Consortium Design for Russian Law // Bulletin of Civil Law. 2018, No. 1. P.3; 1-38; Kurakova N.G., Zinov V.G., Tsvetkova L.A., Eremchenko O.A., Kupriyanova O.I. Features of project consortiums as a new organizational and managerial form of conquering niches in global high-tech markets // https://papers.ssm.com/sol3/papers.cfm?abstract_id=2946157.

[15] Vitol E.Yu., Tyulyaev G.S. Decree. article. Same place; Kurakova N.G., Zinov V.G., Tsvetkova L.A., Eremchenko O.A., Kupriyanova O.I. Decree. article. Ibid

[16] Vitol E.Yu., Tyulyaev G.S. Decree. article. Same place; Kurakova N.G., Zinov V.G., Tsvetkova L.A., Eremchenko O.A., Kupriyanova O.I. Decree. article. Ibid

scientific and technological development. In particular, the Law on National Cooperative Research of 1984 was adopted, which contributed to the reduction of administrative barriers to joint (cooperative) federal and industrial research, which led to the formation of several hundred consortiums engaged in R&D"[17]. "At the legislative level, consortia-type associations are also regulated in South Korea, Taiwan (R&D consortiums), China (technological platforms and public-private partnerships) and Israel (industrial and venture associations)"[18]. State participation in consortiums draws attention: according to information from foreign literature, "even large manufacturing companies are not able to use only their own funds to master expensive technologies, so they are forced to create technological alliances and unite with the state"[19].

In contrast to the legislation and practice of foreign countries: "there is no definition of the term "consortium" in Russian legislation. In scientific and journalistic sources, a consortium is more often defined in the following formula: "A consortium is a temporary association of several persons (usually organizations and / or entrepreneurs) in order to coordinate joint actions and implement a common project"[20].

Due to the absence of special legislation on consortiums, some authors consider it acceptable the practice when Russian "legal entities and entrepreneurs combine their efforts and contributions in those forms that are permissible under Russian law, and can call any of them a consortium. For example, sometimes a consortium means what is a simple partnership. Most often, projects for which people join a consortium are large, expensive programs with a specific purpose, often long-term (industrial, investment, scientific, educational, etc.).[21] Other authors believe that for the legal regulation of the activities of consortiums as scientific and educational associations "a standard agreement on a network form of implementation can be used educational programs (Order of the Ministry of Education and Science of Russia N 882, the Ministry of Education of Russia N 391 of 08/05/2020 «On the organization and implementation of educational activities in the network form of implementation of educational programs» (together with the «Order of the organization and implementation of educational activities in the network form of implementation of educational programs»), which can determine the contributions of each of the participants, issues of consortium management, distribution of profits." [22] The difference between the two of these opinions, obviously,

[17] See about this: Vitol E.Yu., Tyulyaev G.S. Decree. Article., P. 5.

[18] Vitol E.Yu., Tyulyaev G.S. Decree. Article., P. 4.

[19] According to the study of the authors: Vitol E.Yu., Tyulyaev G.S. Decree. Article., p.4

[20]

[21] What is a consortium and how to create it // https://www.sudmos.ru/stati/inye-temy/chto-takoe-konsortsium-i-kak-ego-sozdat

[22] Goncharova V.A. Consortiums in Higher Education: Modern Legal Challenges.// Education and Law No. 1 • 2022. P. 176-181

reflects the different areas of activity assumed by scientists within the framework of consortiums and, accordingly, the differences in civil law and administrative law regulation of these areas.

In scientific journalism, it is noted that consortiums of enterprises have appeared in Russia for a long time: «for example, the Caspian Pipeline Consortium, which is the largest international oil transportation project with the participation of Russia, Kazakhstan and the world's leading mining companies, has been implemented since 1992»[23]. As for the first academic consortiums of universities, their appearance "refers to the 2000s. For example, at the end of 2008, at a meeting of the Union of Rectors of Russia, Lomonosov Moscow State University, N. I. Lobachevsky State University of Nizhny Novgorod, Tomsk State University and South Ural State University signed an agreement on the creation of a public non-profit organization - the Supercomputer Consortium universities of Russia"[24].

On the creation of consortiums in Russia in the modern period, at a meeting of the General Meeting of Professors of the Russian Academy of Sciences, the head of the Ministry of Science and Higher Education of the Russian Federation, Valery Falkov, on the question of whether the merger and accession of universities in Russia is expected in the process of creating consortia, said that: other goals: strengthening the scientific side in universities. But no one will mechanically combine them with institutions for this. All processes will take place in accordance with the logic of the development of the state. When a consortium is formed, each party is independent, any decision on the merger must be made on the basis of agreement with the Russian Academy of Sciences"[25].

The legal basis for the creation and functioning of consortiums in the field of academic activities in the Russian Federation is created by the Federal Law of «On Innovative Science and Technology Centers and on Amendments to Certain Legislative Acts of the Russian Federation». «whose goal is to form more than 100 progressive modern universities in Russia by 2030 - centers of scientific, technological and socio-economic development of the country»[26]. At the same time, as noted in the Decree of the Government of the Russian Federation "On measures to implement the program of strategic academic leadership "Priority 2030": "one of the criteria for assessing the university development program is of the competitor is the modernization of the management system of the university-competitor

[23] Consortiums: a fashionable trend for the university environment or a clearly articulated need// http://libinform.ru/read/articles/Konsortciumy-modnaya-tendentciya-dlya-vuzovskoj-sredy/

[24] Ibid

[25] Dispelling myths: there will be no unification of universities and research institutes - Falkov // Novy Vzglyad Thursday, May 18, 2023 | USD: 80.76 EUR: 87.57 https://newvz.ru/info/203620.html // www.NewVZ.ru

[26] Consortiums: a fashionable trend for the university environment or a clearly articulated need// http://libinform.ru/read/articles/Konsortciumy-modnaya-tendentciya-dlya-vuzovskoj-sredy/

and its interaction with other members of the consortium - associations, including those without the formation of a legal entity, with other universities and (or) scientific organizations, regardless of their departmental affiliation, and, if necessary, with other organizations on the basis of agreements on interaction."[27] According to the Minister of Science and Higher Education of Russia V.N. Falkov, consortiums as voluntary associations of higher educational institutions and other scientific, research and production organizations, enterprises that jointly implement breakthrough projects aimed at the scientific and technological development of the country are one of the key mechanisms for implementing the Strategic Academic Leadership Program. (clause 17 of the Resolution). In Russia as of 2023 more than 100 universities from all regions have united in consortiums to participate in the Priority 2030 program, which is the largest Russian state support project for universities. "Everyone will receive a basic grant of 100 million rubles annually. In addition, the state is ready to support educational institutions with additional amounts that can be invested in the development of sectoral, territorial and research leadership."[28].

[27] Decree of the Government of the Russian Federation «On measures to implement the program of strategic academic leadership «Priority-2030» (dated May 13, 2021 N 729)

[28] Federal universities of Russia: list 2023 More details:https://zaochnik.ru/blog/federalnye-vuzy-rossii/ https://zaochnik.ru/blog/federalnye-vuzy-rossii/

DOI 10.34660/INF.2023.40.52.193

年度周期中 SKA-NEFTYANIK-2 队曲棍球运动员功能状态指标的变化
CHANGES IN THE INDICATORS OF THE FUNCTIONAL STATE OF THE BALL HOCKEY PLAYERS OF THE SKA-NEFTYANIK-2 TEAM IN THE ANNUAL CYCLE

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抽象的。 本文致力于研究 SKA-Neftyanik-2 曲棍球运动员功能状态指标的变化问题，在定期监测他们的状况的基础上，以纠正年度周期的训练过程，同时考虑到 俄罗斯远东地区的特殊气候和地理条件。 在进行研究的过程中，我们确定了运动员在班迪有效竞技活动的功能状态标准，其中最重要的是表征运动员功能状态的整体指标（对身体活动的适应程度，储备 管理和健身），到比赛期间要超过95%。

关键词：曲棍球运动员，年度周期，硬件软件复合体“Omega-C”，功能状态，心率变异性。

Abstract. *The article is devoted to the problem of studying the changes in the indicators of the functional state of the SKA-Neftyanik-2 ball hockey players on the basis of regular monitoring of their condition to correct the training process in an annual cycle, taking into account the specific climatic and geographical conditions of the Russian Far East. In the process of conducting research, we have determined the criteria of the functional state of athletes for effective competitive activity in bandy, the most significant of which are integral indicators characterizing the functional state of the player (degree of adaptation to physical activity, reserves of management and fitness), which by the competitive period should exceed 95%.*

Keywords: *ball hockey players, annual cycle, hardware software complex “Omega-C”, functional state, heart rate variability.*

Introduction

The preparation of ball hockey players for competitive activity is complex, including an assessment of the psychophysical and psychoemotional state of both individual players and the entire team as a whole. The formation of physical qualities of an athlete and his psychoemotional state significantly affect the effectiveness of competitive activity. Optimization of the athlete's condition at the final stage of preparation for competitions and directly during the competition period is a key moment in improving the effectiveness of the team's gaming activities.

In modern bandy, the training process and competitive activities are carried out against a background of high emotional and mental stress. At the same time, there is a shortage of scientifically based psychological and pedagogical recommendations for optimizing and improving psychofunctional training in modern conditions, express diagnostics of changes in psychophysiological and mental functions of ball hockey players during training and competitive activities.

As part of the state budget research work on the topic ""Development of methods of competitive training of athletes in bandy"" commissioned by the Ministry of Sports of the Russian Federation for 2018 - 2020. [2] a study of the level of the functional state of ball hockey players was conducted to improve the system of training athletes based on regular monitoring of their condition and correction of the training process in the annual cycle, taking into account the specific climatic and geographical conditions of the Russian Far East.

1. The experimental part

When assessing the functional state of the body and its functional capabilities, the Omega-Sport agroindustrial complex was used, which allows, based on the analysis of heart rate variability, to evaluate such indicators as adaptation to physical exertion, the level and reserves of fitness, the level and reserves of energy supply, and the psycho-emotional state. The positive aspects of this technique are the mobility of the agro-industrial complex and the relative ease of its use. If necessary, it is possible to monitor changes in the condition of the subjects almost daily, making appropriate adjustments during the training, competition or recovery process. Agro-industrial complex "Omega-Sport" makes it possible to monitor the progress of recovery processes and ensure individual planning of the optimal work regime during the day. In the end, the use of the Omega-Sport agroindustrial complex allows not only to ensure the growth of physical performance indicators, but also to predict the athlete's achievement of peak fitness [1].

The testing of hockey players was organized and conducted in the preparatory period (at the end of the general preparatory stage - August 2019, at the end of the special preparatory stage - October 2019 and in the competitive period - January, March 2020) of the annual training cycle. So, during three stages, 24 hockey players took part in the survey, according to the results of testing, a number of features can be identified.

The athletes of the SKA-NEFTYANIK-2 team were examined in the morning hours in the laboratory of "Monitoring of physical condition" of the Far Eastern State Academy of Physical Culture.

2. Results

During the examination of athletes in the preparatory period (August 2019), it was determined that almost all indicators of physical condition were at the normal level in the range from 72% to 86% A different picture is observed in the subjects at the end of the special training stage of training (October 2019). It can be noted that the use of various forms and means in the process of sports training has brought its results, and at the time of testing, hockey players have gained optimal shape in terms of functional state. Table 1 shows the indicators of the functional state of athletes at the stage of pre-competitive training. When considering the indicators characterizing the functional state, it can be noted that for most of the studied indicators there was a significant improvement in indicators, especially in the indicator of the level of adaptation to physical activity by 26,7% ($p<0,05$).

According to the results of the conducted testing and comparative analysis of the indicators obtained during the pre-competitive preparation, it is possible to state the fact that the functional state of hockey players is quite optimal, which fully corresponds to the level of their physical fitness.

Table 1

Comparative analysis of the results of the study of the functional state of ball hockey players in the preparatory (pre-competition) stage of preparation

Indicators	August 2019 $M_1 \pm m$	October 2019 $M_1 \pm m$	Difference		p
			Units	%	
Adaptation to physical activity	72,05±3,86	91,32±4,55	19,3	26,7	<0,05
Fitness of the body	73,00±3,73	94,95±4,31	21,95	30	<0,05
Reserve of fitness	80,82±2,82	94,50±3,96	13,7	16,9	<0,05
Energy supply	86,86±3,65	89,64±3,94	2,8	3,2	>0,05
Energy supply reserves	85,45±3,1	98,55±3,88	13,1	15,3	<0,05
The level of psychoemotional state	81,14±3,42	85,91±3,54	4,8	5,9	>0,05
Management reserves	82,41±3,82	94,05±3,93	11,6	14,1	<0,05

However, despite a fairly good functional condition at the second stage of preparation, in most cases the daily forecast is not optimistic. So, in the first half of the day, the peak of the rise of the studied indicators is within 9.00 – 10.00 in the morning, then by 13.00 there is a rise to high values. The next decrease in values is noted around 14.00 – 16.00 hours of the day and only increases to the specified values by 19.00.

Thus, despite the fairly good functional condition of athletes, there is a decrease in values during the day, and in the case of a game at the time of another decline in indicators, this does not bode well. In this case, it is necessary to take into account the individual biological rhythms of athletes and bring them to a state where the spread during the day would not exceed 15-20%.

At the final stage, it was necessary to track the change in the studied indicators at the next stage of sports training, namely, the percentage of change in the competitive period (Table 2).

Table 2

Comparative analysis of the results of the study of the functional state of hockey players with a ball in the competitive stage of preparation

Indicators	January 2020 $M_1 \pm m$	March 2020 $M_1 \pm m$	Difference		p
			Units	%	
Adaptation to physical activity	74,2±3,3	76,1±4,5	1,9	2,5	>0,05
Fitness of the body	89,4±4,3	85,95±4,3	3,45	3,9	>0,05
Reserve of fitness	69,3±4,0	91,20±3,9	21,9	31,6	<0,05
Energy supply	64,1±3,1	70,6±3,7	6,5	10,1	<0,05
Energy supply reserves	69,5±3,9	69,15±3,9	0,35	0,5	>0,05
The level of psychoemotional state	68,4±3,5	59,8±3,4	8,6	12,6	<0,05
Management reserves	62,7±3,8	65,05±3,9	2,35	3,7	>0,05

Based on the data obtained, three indicators of the functional state of ball hockey players have significantly changed, while such indicators as the fitness reserve and energy supply have improved by 31,6% and 10,1%, respectively, and the indicator of the level of psycho-emotional state has slightly decreased by 12,6% ($p<0,05$). After conducting a comparative analysis of the final data of the pre-competitive and competitive periods, you can make a number of conclusions (Table3).

Table 3

Comparative analysis of the results of the study of the functional state of hockey players with a ball in the pre-competition and in the competitive stage of preparation

Indicators	October 2019 $M_1 \pm m$	March 2020 $M_1 \pm m$	Difference		p
			Units	%	
Adaptation to physical activity	91,32±4,55	76,1±4,5	15,22	16,7	<0,05
Fitness of the body	94,95±4,31	85,95±4,3	9	9,5	>0,05
Reserve of fitness	94,50±3,96	91,2±3,9	3,3	3,5	>0,05

Energy supply	89,64±3,94	70,6±3,7	19,04	21,3	<0,05
Energy supply reserves	98,55±3,88	69,15±3,9	29,4	29,8	<0,05
The level of psychoemotional state	85,91±3,54	59,8±3,4	26,1	30,4	<0,05
Management reserves	94,05±3,93	65,05±3,9	29	30,8	<0,05

During the period of competitive activity, even highly qualified athletes have changes in their functional state. While waiting for the game, the athlete is exposed to various stressful influences, which entail a decrease in both physical fitness and functional state indicators.

Analyzing the data in Table 3, which presents a comparative characteristic of the indicators of the pre-competition and competitive periods, we can talk about the negative impact not only of this psychological stress from the expected result, but also, apparently, from the flight to the venue of the competition.

Thus, adaptation to physical exertion has significantly decreased – from 91,32% to 76,1%. The fitness of the organism, which had no significant changes, in absolute values nevertheless underwent a regression by 9% and amounted to 85,95%. A similar situation is noted for such an indicator as the reserves of fitness, which decreased by 3,3% and amounted to 91,2%. This is not a critical value and can still be described as a high level.

However, despite the fact that a number of indicators relatively retained their positions achieved in the pre-competition period, most of them decreased by a fairly large percentage. Thus, the energy supply of the body and its reserves decreased by 21,3% and 29,8%. This fact can be explained, first of all, by the flight and the strong emotional stress that an athlete experiences before the start of key games, internal tension is growing, which inevitably entails the waste of energy substances from the main reserve sources, which inevitably leads to a decrease in the effectiveness of competitive activities.

At the same time, emotional tension could not but affect such an indicator as the psychoemotional state and reserves of management of the psychoemotional state. As a result, these indicators decreased from the maximum level of 85,91% and 94,05% to values that can be characterized below the normalized values – to 59,8% and 65,05%, respectively.

3. CONCLUSIONS

Thus, monitoring of the indicators of the functional state of athletes is necessary to assess and predict changes in athletic form and energy supply in preparation for the most important competitions, taking into account individual reactions to the features of the means and methods used in the training process.

In the process of conducting research, we have determined the criteria of the functional state of athletes for effective competitive activity in bandy, the most significant of which are:

- integral indicators characterizing the functional state of the player (the degree of adaptation to physical activity, management reserves and fitness), which by the competitive period should exceed 95%.

In the dynamic monitoring mode, the use of this complex allows:

1) monitor the functional state of the athlete;

2) evaluate the level of training and competitive load;

3) to determine the effectiveness of various methods of recovery and prevention:

- during the pre-season training;
- during the competition period;
- during rehabilitation after sports injuries;
- when carrying out supportive and corrective medication and physiotherapy measures.

During group examinations:

- to select the most prepared athletes at the moment;
- evaluate the prospects for improvement, maintenance or deterioration of athletic fitness;
- to form groups of athletes according to the level of physical fitness;
- to identify "sudden", unmotivated decreases in functional indicators resulting from a possible violation of the sports regime.

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DOI 10.34660/INF.2023.86.76.194

车里雅宾斯克 Tamara Belitskaya 师范学校

PEDAGOGICAL SCHOOL OF TAMARA BELITSKAYA IN CHELYABINSK[1]

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注解。 这篇文章简要介绍了一位教师、音乐学家讲师、俄罗斯文化荣誉工作者、俄罗斯作家联盟成员塔玛拉•米哈伊洛夫娜•别利茨卡娅 (Tamara Mikhailovna Belitskaya) 的生活和职业活动。 在撰写作者对 T.M. 的学生和同事进行的访谈的文章材料时。 Belitskoy，以及通过电话与 Tamara Mikhaylovna 一起使用。 在对话者中，俄罗斯 D. G. Musatova 文化工作者，艺术候选人，O. Yu 副教授。 伊万诺娃，俄罗斯荣誉艺术家，教授，俄罗斯作曲家联盟和戏剧人物联盟成员 A. D. Krivoshei，教师 E. B. Ishchenko 和 E. I. Muzyukina。 以诗意的方式，对教育科学候选人、I. G. Dymova 副教授的采访听起来最符合作者陈述的基调。

关键词：Tamara Mikhailovna belitskaya，教学学校，音乐学家，讲师，教育家，教师，车里雅宾斯克音乐学院。 P.I. 柴可夫斯基。

Annotation. *The article presents a brief sketch of the life and professional activities of a teacher, musicologist-lecturer, honored worker of culture of Russia, member of the Union of writers of Russia Tamara Mikhailovna Belitskaya. When writing the article materials of interviews which the author conducted with pupils and colleagues of T.M. Belitskoy, and also with Tamara Mikhaylovna by phone were used. Among the interlocutors-honored worker of culture of Russia D. G. Musatova, candidate of arts, associate Professor O. Yu. Ivanova, honored artist of Russia, Professor, member of the Union of composers and the Union of theatrical figures of Russia A. D. Krivoshei, teachers E. B. Ishchenko and E. I. Muzyukina. In a poetic way, the interview of the candidate of pedagogical Sciences, associate Professor I. G. Dymova sounds, which most corresponds to the tone of the author's statement.*

Keywords: *Tamara Mikhailovna belitskaya, pedagogical school, musicologist, lecturer, educator, teacher, Chelyabinsk music College. P. I. Tchaikovsky.*

[1] The study was supported by a grant from the Russian Science Foundation and the Chelyabinsk Region No. 23-28-10278, https://rscf.ru/project/23-28-10278/.

Tamara Mikhailovna Belitskaya (Korzinnikova), was born on December 15, 1931 in the city of Ulan-Ude, Buryat SSR. Father - Korzinnikov Mikhail Alexandrovich, worked in a construction organization. Mom - Vera Mikhailovna, was a proofreader in the newspapers of those cities where the family had to live.

From Ulan-Ude, the Korzinnikov family moved to Novosibirsk, and then to the city of Magnitogorsk, Chelyabinsk region.

In Magnitogorsk, Tamara Mikhailovna entered the music school at the music college[2]. After graduating from a music school, in 1947, he entered the music school at the piano department in the class of Semyon Grigorievich Eidinov, a graduate of the Moscow Conservatory with a degree in choral conducting, class of Professor G. Dmitrevsky. At this time, Tamara Korzinnikova met Boris Mikhailovich Belitsky - in 1948 she became his first student.

Tamara Mikhailovna was an excellent pianist - in her student years she took part in all city concerts, and in 1950 she took part in the All-Russian competition of pianists of secondary educational institutions in the city of Kazan [3, p. 9]. Having not won a laureate, Tamara Mikhailovna, nevertheless, received an invitation from the head of the department of special piano and vice-rector for science Vladimir Grigoryevich Apresov[3] to study at the Kazan Conservatory.

To Kazan T.M. Belitskaya left in 1951, having graduated with honors from the Magnitogorsk Musical College. When entering the conservatory, a rather large competition was held - 3 people per place. Having entered the piano department, Tamara Mikhailovna, due to a disease of her hands, soon transferred to the theoretical and composition department.

While studying at the conservatory T.M. Belitskaya worked at the music school No. 2 in Kazan. Having completed her studies and received a diploma in musicology in 1956, she was sent to the Kazan Musical College as a teacher of musical and theoretical disciplines. The following year, 1957, Tamara Mikhailovna returned to Magnitogorsk and went to work at the Musical College. M.I. Glinka.

As Tamara Mikhailovna herself writes, the school was “loaded to the eyeballs for two rates” [1, p. 62], as there were not enough teachers. In addition, Boris Mikhailovich Belitsky attracted her, along with other musicologists, to participate in city lectures-concerts, which were called “Musical Environments”. Concerts of

[2] The music school, which later became the base of the music school, was opened in 1934. The first director is Mikhail Izrailevich Kaminsky, a student of the theory and composition faculty of the Moscow Conservatory. In 1935, the school had 75 students. In 1939, on the basis of the school, a music school was officially opened - one of the fifteen in the country at that time [4].

[3] Apresov Vladimir Grigorievich - pianist, teacher. In 1938 he graduated from the Baku Conservatory in the class of G. G. Sharoev, in 1940 he graduated from the Moscow State Conservatory in the class of M. V. Yudina. In 1947-64 he was vice-rector for scientific and educational work of the Kazan State Conservatory. Honored Artist of the TASSR, RSFSR (1957, 1972). Diploma winner of the All-Union Piano Competition (1938).

teachers and students of the school gathered almost the entire city intelligentsia, since at that time they were the only musical center in Magnitogorsk.

Three years later, in 1960, Tamara Mikhailovna leaves Magnitogorsk and leaves to work at the Sukhum Musical College named after. D. Arakishvili (now the Sukhumi State Musical College named after A. Ch. Chichba). It was the first educational institution in the Republic of Abkhazia, opened in 1930 and preparing professional musicians. A large number of famous graduates were brought up within the walls of the school. The educational institution at that moment was in dire need of specialists of a similar profile, and therefore Tamara Mikhailovna was gladly accepted into the staff. And again T.M. Belitskaya works two-time at the school, as well as a lecturer at the local Philharmonic.

Work at the music school in Sukhumi continued until 1965, and from September 1965, Tamara Mikhailovna, having moved to Chelyabinsk with Boris Mikhailovich Belitsky, began work at the Chelyabinsk music school. “Tamara Mikhailovna and Boris Mikhailovich Belitsky are an amazing couple on our musical Olympus. Such bright musicians, who make up a single whole for me, are not often found in life. Communication with them leaves the deepest imprint in the soul of everyone, because they managed to instill in us the main thing - faith in the enduring values of great musical creations, devotion to art. Their deeds illuminated everything they touched: creative activity, pedagogical work, household chores. That is why in the entire space of “our house” (as Boris Mikhailovich called the music school) there was an amazing atmosphere of order, true admiration for the creative essence of our profession as a musician-performer, musician-educator, musician-researcher. It is impossible to write about such people in “contemptible” prose. The thought “clings” to the poetic lines, which reflect the essence of their pedagogical covenant of being:

I asked the high sun

How can I flare up brighter than the dawn?

The sun didn’t answer

But the soul heard: “Burn!” K. Balmont ” [from an interview with I.G. Dymova].

As Tamara Mikhailovna herself writes, the years in Chelyabinsk are the most “serious period of her life” [1, p. 62]. It should be noted the widest range of professional activities that T.M. Belitskaya is both pedagogical, and lecturer-educational, and correspondent activity.

The very first group of students of the theoretical department, which Tamara Mikhailovna graduated from the music school, consisted of six people. At the state examinations, they all appeared before the commission and numerous guests as free and thinking creative people. According to the results of the exams, the entire group received red diplomas.

According to O.Yu. Ivanova, “learning from Tamara Mikhailovna was easy and interesting. Easy - because she explained any, even the most complex topic simply, clearly and understandably. Interesting - because Tamara Mikhailovna - an ardent opponent of everything boring, ordinary and colorless, the owner of a natural mind and sparkling humor - fascinated her with her “extra-domestic”, “artistic” “artistic” attitude” [from an interview with O.Yu. Ivanova].

Over the years, developed its own methodology, a clear, well-established system of education. All this gave excellent results: students T.M. Belitskaya, entering the country’s universities, taking part in various professional competitions, showed a consistently high level of training[4].

From the memoirs of I. G. Dymova: “Tamara Mikhailovna taught us a block of theoretical disciplines: elementary music theory, harmony and solfeggio. Consciousness left in the “pantry” of memory our study of numerous textbooks, books, monographs, preparation for theoretical Olympiads, amazing vocal competitions, but most importantly, she managed to lay the foundation for the future profession of a teacher - theorist and professional musician. Her pedagogical system included: a creative approach to conducting classes, a clear distribution of study time, the task of “infecting” a student with a love for music, for studying the finest details of a musical text, and more broadly - knowledge of the basics of different types of art. The latter was so necessary in our educational work. And in this field of activity, Tamara Mikhailovna was an example for us. We constantly went to her lectures, learned to select interesting material, build it logically, string it on a semantic canvas. I remember how, in preparation for the next public lecture, she told us not without humor:

There is little use in a good thought,

When she is like a bow on the side” [from an interview with I.G. Dymova].

Today, in conversations, students of Tamara Mikhailovna of different generations unanimously note the high professionalism of lectures on academic subjects - for the record, the teacher gave short and understandable notes, according to which a topic of any complexity was easily mastered. Students always tried to do their homework, and they tried to do it as bright and original as possible in order to earn the approval of the teacher.

In addition to his favorite subjects - solfeggio and harmony, during the years of work at the music school T.M. Belitskaya led the so-called “Musical Lounge”, where she introduced young novice musicologists and students of other specialties

[4] To name just a few of the many facts: in 1989 in Ufa, a regional solfeggio competition was held among students of 3-4 courses of theoretical departments. 3rd year students Irina Kadyk and Elena Bykova (now Ishchenko) took first place, outperforming their rivals in points by a wide margin. In April 1997, the 12th Theoretical Olympiad was held in Moscow for senior students of music schools in Russia and Belarus, where student T.M. Belitskaya Polina Pashkova won the title of Diploma winner of the Olympics.

to new music. One of the participants in such a living room was A.D. Krivoshey - Professor, Honored Artist of the Russian Federation, Member of the Union of Composers of Russia, then a student of the theoretical department of a music school. "I am very grateful to Tamara Mikhailovna for immersing me in the atmosphere of modernity," says Anatoly Davidovich. The composer notes that it was within the framework of the "Musical Lounge" that Tamara Mikhailovna first introduced N.Ya. Myaskovsky, D.D. Shostakovich and other contemporary composers. Theorists and pianists did not just listen to what teachers said. After the music stops, students must analyze what they have heard. Tamara Mikhailovna always entered into a discussion, corrected, helped to find the right solution in the analysis of musical works [from an interview with A.D. Krivoshey].

In the early 1970s, a philharmonic society was organized at the Chelyabinsk Musical College, which was called the "University of Musical Education of Youth". Within the framework of this philharmonic society, Tamara Mikhailovna often went on stage and gave lectures, which were almost always recorded by the audience in the hall. This is how another hypostasis of Tamara Mikhailovna's personality manifested itself - enlightenment. T.M. Belitskaya worked as a lecturer at the Philharmonic Society and the Knowledge Society; freelance correspondent for two central city newspapers - "Chelyabinsk Rabochiy" and "Vecherniy Chelyabinsk"; She was the author of musical and literary programs on television and radio.

Dozens of lectures created by Tamara Mikhailovna, stored in the radio fund of Chelyabinsk, are "reference examples of the lecture genre. This is a golden fund for the young generation of musicologists" [from an interview with O.Yu. Ivanova]. The cycle "Masterpieces of World Musical Classics" has always been listened to with great pleasure, and so far many radio listeners of the older generation recall its programs with pleasure. As noted by V.S. Filippova[5], Tamara Mikhailovna is a highly educated, intelligent and worthy person in all respects. Very obliging, she was never late, helped to find or brought recordings of works to the radio studio. "But the most important thing is her voice - very inviting, with unique intonations inherent only to her. She spoke about Glinka or Tchaikovsky with completely different intonations than about Verdi or Mozart," says Vera Sergeevna. Speeches by T.M. Belitskaya have always been very bright and accessible. The beginning of such lectures was laid on television. Among the programs she created are the cycles of special programs "Music Box" - a program for children, "Music and Rev-

[5] Filippova Vera Sergeevna - radio journalist. Graduated from the Faculty of History and Philology of ChSPI (YuUrGPPU) (1960). At the Chelyabinsk Regional Radio, she worked as an editor of Izvestia, an editor of youth programs, and a commentator. Since 1965, the main theme of Vera Sergeevna has become the musical life of Chelyabinsk and the Southern Urals. The journalist attracted the best musicologists, performers, teachers of the region to the creation of essay, monographic, informational musical programs, thanks to which the program "Musical Thursday" managed to widely present the creative potential of the region, its musical culture.

olution". "Literature and Music", "Musical Panorama" - a review of the musical events of the city and region. On the radio, in addition to the author's programs, Tamara Mikhailovna takes part in such cycle programs as "Chelyabinsk musicians at the microphone", the radio magazine "My Sinegorye". Later, after moving to Tula in 2000, Tamara Mikhailovna also hosted musical and literary programs at the Tula branch of Russian radio for five years. Many programs of T.M. Belitskaya were noted by the artistic council and the leadership of the radio committee as the best broadcasts of the decade. Such programs and Tamara Mikhailovna herself received a huge number of letters of approval from the population. "A lecturer by the grace of God - of the highest, unsurpassed skill!" [from an interview with O.Yu. Ivanova].

Educational activities of T.M. Belitskaya includes not only radio and television programs. In addition to a huge number of articles in various publications devoted to musical themes and talented countrymen (A.A. Berkovich, G.S. Zaitseva and many others), the musicologist turned to the study of the work of composers living and creating next to her. So, in 1998, Tamara Mikhailovna turned to the study of the work of the Ural composer A.D. Torticollis. "It was the almost complete absence of monographs and solid printed works about the composers of the Chelyabinsk organization that made me take up the pen…. Meanwhile, the interest in the music of local composers is quite wide. The result was the book "Composer A.D. Krivoshey," writes Tamara Mikhailovna in the preface to the book [2, p. 6]. One of the important advantages of the book is the thorough musicological analysis of the composer's works, which are considered as a cultural phenomenon of the late 20th century. The book is a valuable contribution to musical local history and is of interest to a wide range of musicians.

In 2013, Tamara Mikhailovna published the book "Strokes to the Portrait of a Traveling Musician", dedicated to the life and work of the famous Russian composer Yuli Evgenievich Galperin [1].

In 2000, on the initiative of Tamara Mikhailovna and under her editorship, a memorial book "B.M. Belitsky in the memory of friends and students" [3], in which she collected the memories of colleagues, students, friends and loved ones about this great man.

In addition to pedagogical and educational work, Tamara Mikhailovna for many years, starting in 1970, headed the theoretical department at the Chelyabinsk Musical College. In addition, in the 1980s she was the chairman of the Regional Methodological Association of Teachers of Musical Theoretical Disciplines. In 1994, when on the basis of the theoretical department a department was created in the specialty "Musicology", she became the first head of the department.

It is necessary to express full agreement with the words of D.G. Musatova that "the image of Tamara Mikhailovna underlies the idea that a person should

be professional in all respects. Professionalism T.M. Belitskaya was manifested in responsibility for the cause, in the ability to do this business, in responsibility for the children she taught, for her colleagues. Professionalism is in the feeling of one's own dignity and the dignity of one's profession" [from an interview with D.G. Musatova].

For many years of work T.M. Belitskaya in different years was awarded diplomas of the Ministry of Culture of the USSR, the RSFSR, the Abkhaz SSR, in 1981 she was awarded the badge of the USSR Ministry of Culture "For excellent work", in 1985 she was awarded the title "Honored Worker of Culture of the RSFSR".

According to I. G. Dymova, "God gave Tamara Mikhailovna the talent of a leader, and there was much to learn from her. She had organizational skills, experience in the psychology of communication, so she could resolve any situation. And they were sometimes difficult. But her tact, philosophical wisdom did not hurt anyone, and she instructed us, already young colleagues, to be indifferent to any person:

I love friends, but also enemies

I think it's worth appreciating...

From a friend I know who I am

And from the enemy - what I should be. W. Goethe" [from an interview with I.G. Dymova].

The last graduation from the middle (second) stage of the Chelyabinsk Higher Musical School (HEI) by a group of theorists led by T.M. Belitskaya took place in 2000. The pages of life associated with the name of Tamara Mikhailovna will forever remain in the memory of her students, among whom is the author of this article.

After leaving for Tula in 2000, Tamara Belitskaya's talent as a writer was revealed. A new creative period begins. The first published book was the detective story "A case in the entrance" (2008). Tamara Mikhailovna joined the Tula literary association "Pegasus" and began to be regularly published in local literary magazines - "On the Wings of Pegasus" and "Prioksky Dawns". To date, fourteen books have been published, and four more are waiting in the wings. In June 2010, Tamara Mikhailovna was admitted to the Tula branch of the Writers' Union, and in 2013 she became a member of the Writers' Union of Russia (Moscow).

Tamara Mikhailovna Belitskaya is a talented teacher, a bright, original personality with her own principles and ideas about life and art. Honest, strict, fair, openly and directly calling things "by their proper names." "An amazing sense of taste, refined style is manifested in everything: in behavior, manner of dressing and wearing jewelry. Her elegant stature, regal posture, unhurried movements and speech are literally mesmerizing. This is what today is called the fashionable word "charisma" [from an interview with O.Yu. Ivanova].

A red thread through all the conversations conducted by the author is the regret that Tamara Mikhailovna left work in “our house” (B.M. Belitsky) and left. How much more invaluable experience, life and professional, she was able to pass on to us - her former students, and now colleagues. Love, warmth and tenderness towards the Teacher are very accurately expressed by the words of I. G. Dymova: “Unfortunately, in recent years we have had little contact (this was my personal difficult circumstances), but I always remembered my wonderful teacher with great warmth and love and leader. When I was asked to say a few words about Tamara Mikhailovna Belitskaya, the details of our communication flooded in a motley swarm both during my studies at the music school, and at the time of work after graduating from the Russian Academy of Music. Gnesins. All of them are signs of her beauty, charm, humanity, pedagogical skills. And again, only poetic lines can convey what is consonant with my state of mind:

There’s not just one memory
Here life spoke again -
And the same charm in you,
And the same love in my soul. F. Tyutchev” [from an interview with I.G. Dymova].

T.M. Belitskaya is one of the leading musicologists who has made a great contribution to the formation of the socio-cultural situation in the Ural region. I would like to wish Tamara Mikhailovna good health, long life and an inexhaustible source of inspiration.

With deep respect and reverence.

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DOI 10.34660/INF.2023.37.16.195

音乐节奏运动作为培养学龄前儿童音乐能力的一种方式
MUSICAL-RHYTHMIC MOVEMENT AS A MEANS OF DEVELOPING MUSICAL ABILITIES OF OLDER PRESCHOOL CHILDREN

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抽象的。 本文分析了通过音乐节奏运动发展学龄前儿童音乐能力的教学条件。 作者考虑了心理学家 L.A. Wenger、N.S. 莱特斯，S.L. 鲁宾斯坦，V.D. 沙德里科娃； 以及科学家在音乐教育心理学领域的工作 N.A. Vetlugina, D.K. 基尔纳斯卡娅，B.M. 特普洛娃，A.V. 托罗波娃等。 作者介绍了在心理学和教育学文献分析过程中得出的理论结论，还描述了在莫斯科国立教育大学教学实践的基本组织中对假设进行实验和探索性检验的过程。

关键词：音乐节奏运动，学龄前儿童，音乐能力，节奏感，形式感，力度感，对音乐的情绪反应。

Abstract. *The article analyzes the pedagogical conditions for the development of musical abilities of preschool children through the musical-rhythmic movement. The authors consider the works of psychologists L.A. Wenger, N.S. Leites, S.L. Rubinstein, V.D. Shadrikova; as well as the work of scientists in the field of psychology of music education N.A. Vetlugina, D.K. Kirnarskaya, B.M. Teplova, A.V. Toropova and others. The authors present the theoretical conclusions made in the course of the analysis of psychological and pedagogical literature, and also describe the course of the experimental and exploratory testing of the hypothesis in the basic organization for pedagogical practice of the Moscow Pedagogical State University.*

Keywords: *musical-rhythmic movement, preschool children, musical abilities, sense of metrorhythm, sense of form, sense of dynamics, emotional responsiveness to music.*

Modern scientific research indicates that the development of musical abilities must begin in childhood, since the lack of vivid musical impressions at this age is almost impossible to compensate for later.

The category of ability is multifaceted in the works of a number of scientists - L.A. Wenger [1], N.S. Leites [2], S.L. Rubinstein [3], V.D. Shadrikov [4]. The category of «musical abilities» is also thoroughly considered in the studies of psychologists. In this regard, we can name the names of N.A. Vetlugina [5], D.K. Kirnarskaya [6], B.M. Teplov [7], A.V. Toropova [8]. It is also well known that abilities, and in particular musical abilities, develop in activity. Meanwhile, methodological developments on the development of children's musical abilities through the musical and plastic movement as a type of musical activity of older preschoolers are not enough.

The study involved a theoretical consideration of the problem and experimental and exploratory testing of the hypothesis. The following conclusions were drawn by the method of analysis of psychological, pedagogical and musicological literature:

1. Abilities are individual personality traits that are subjective conditions for the success of a child in a certain kind of musical activity.

2. The most important in the theory of abilities is the problem of their development.

3. The musical abilities of preschool children develop as a result of training, ensuring the success of various activities.

Experimental and search work was carried out in the base organization of the Faculty of Musical Art of Moscow State Pedagogical University.

The experimental work consisted of three stages:

- *ascertaining*, in order to identify the level of musical abilities of children of senior preschool age before approbation of the model developed by us;

- *formative*, with the aim of forming the musical abilities of children in the conditions of musical and rhythmic movement;

– *verification*, in order to check the effectiveness of the work performed.

During the ascertaining stage of experimental and search work, the following research methods were applied:

- pedagogical supervision;

- testing.

Testing (diagnostics) was carried out to determine the level of development:

- sense of tempo and rhythm;

- feelings of musical form;

- dynamic feeling;

- emotional responsiveness to music.

To diagnose the level of development of children's musical abilities, a set of exercises was developed. Taking into account the specifics of the age of older

preschoolers, and, in particular, the "poetic" perception of the world by children, the exercises had the figurative name "Grasshoppers are walking" (an exercise to form the feeling of a musical phrase), "After the rain" (an exercise to form dynamic hearing), " I want to sleep" (an exercise to form the feeling of the off-beat structure of the melody).

For example, to diagnose the sense of rhythm, we proposed to perform the exercise "Lullaby" (music by A. Arensky, method by I.V. Lifits) [9].

Description. Basic level: children are scattered. They listen to two measures of the introduction and begin to sway evenly from side to side, as if shaking an imaginary doll. On the piano conclusion (the last two measures), the children put the toy in the "bed".

Increased level of difficulty: when repeating the exercise, children are invited to continue "shaking the doll" after the music stops, and after a specially made pause in the sound, check that the preschoolers observe the tempo set by the music.

We considered the following criteria for evaluation:

3 points, high level. Accurate (error-free) reproduction of the rhythmic pattern throughout the entire sound of the music and without it, stopping clearly with the end of the music.

2 points, average level. Playing a rhythm with one or two rhythmic disturbances and with an exact stop at the end of the music.

1 point, weak level. Reproduction of the rhythm with three or four rhythmic disturbances and with an indistinct stop at the end of the music.

When planning classes for the formative stage, we proceeded from the structure of the lesson, which provides not only exercises, but also musical games and etudes for creative self-realization. We chose the piano cycle «Children's Album» by P.I. Tchaikovsky (method of T.V. Koreneva) [10]. As an example, we give a description of one of the lessons of the formative stage.

Teacher: Children, today we will get acquainted with the concepts of the pulse of music - a meter. Let's listen to a piece of music («Waltz» from the «Children's Album» by P.I. Tchaikovsky sounds).

Next, the teacher suggests marking the even alternation of beats with clapping, and then with steps, making 3 steps per beat. After that, only the strong beat is noted by clapping your hands. In movement, a strong beat is indicated by a longer step, and two weak beats are indicated by steps on toes. Together with the children, the teacher conducts the «Waltz» on ¾ and initiates the continuation of acquaintance with other pieces of the «Children's Album».

Teacher: Imagine that we went to the past to visit the girl Katya. She has a birthday. It is as if the musicians of the orchestra (violinists, cellists, flute players), who have arrived, enter and sit down in the living room (a large elegant room at home). Everyone congratulates the birthday girl. (Sounds «Waltz». Children depict the plot proposed by the teacher).

Teacher: (after the end of the music). Gifts are given for birthdays. So Katya's dad gave her a doll. Let's draw the movements of the clockwork doll dance. What movements can we use?

Possible options: tilt the body forward and return to its original position; body turns to the left, right; alternate lifting of the left and right arms, bent at the elbows, etc.

(The play "New Doll" by P.I. Tchaikovsky sounds. Children perform elements of dance movements in the form of a clockwork doll).

An important setting of classes is the correspondence of movements to the nature of the sound of music. At the same time, the attention of children is aggravated by the fact that there is no preliminary listening to music when performing tasks. In cases of difficulties, the teacher tactfully helps to cope with the goal, given that the reasons for inadequate expression of the nature of music in movement by children can be:

- mental and physical lethargy;
- poor coordination of movements
- underdevelopment of certain muscle groups.

The verification stage was aimed at identifying the level of development of musical abilities of older preschoolers after a series of classes. Testing was carried out similarly to the ascertaining stage. Quests have been partially updated. So, for example, to determine the level of development of the sense of metrorhythm, we proposed the exercise "Marching" (music by A. Petrov, method by I.V. Lifits) [9].

Description. Basic level: the children form a column one after another and after a short introduction they begin to march along the walls of the room. Stop exactly with the cessation of the music.

Increased level of difficulty: children are invited to continue marching after the music stops (the sound is interrupted for a while), and after a pause, check that the tempo set by the music is observed.

We considered the following criteria for evaluation:

3 points, *high level.* Accurate (error-free) reproduction of the meter throughout the entire sound of the music and without it, stopping clearly with the end of the music.

2 points, *average level*. Reproduction of a meter with one or two rhythmic disturbances and with an exact stop at the end of the music.

1 point, *weak level*. Reproduction of a meter with three or four rhythmic disturbances and with an indistinct stop at the end of the music.

Comparing the results obtained at the formative and ascertaining stages of experimental and search work, it was found that the level of development of the musical abilities of older preschoolers after a systematic series of classes became much higher.

Thus, the hypothesis was considered theoretically and confirmed experimentally, which allows us to draw the following conclusions:

1. Musical abilities in the existing general psychological classification are classified as special, i.e. those necessary for successful practice and determined by the nature of music.

2. The main indicator of musicality in musical psychology is considered emotional responsiveness to music, and the main abilities include modal sense and a sense of rhythm. Psychologists consider timbre, dynamic, harmonic hearing and a sense of form to be minor components of the musicality complex.

3. Musical-rhythmic movement as a type of musical activity of older preschoolers is an effective means of forming and developing the musical abilities of children, subject to a number of pedagogical conditions:

- understanding by the teacher-musician of the close relationship between the development of musical abilities and mental processes of perception, memory, imagination, thinking, attention;
- implementation in the classroom of the principle of conscious and active perception of musical art by children;
- maintaining a balance in classes to improve the level of operational development of skills and abilities, as well as the level of subjective-creative expressiveness of movements;
- the priority of a personality-oriented and differentiated approach to children in the conditions of frontal forms of conducting classes.

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DOI 10.34660/INF.2023.35.64.196

音乐作为纠正小学生压力状况的一种手段

MUSIC AS A MEANS OF CORRECTING STRESS CONDITIONS OF PRIMARY SCHOOL CHILDREN

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抽象的。 在中国，两千多年前，为了纠正人的重要器官和精神状态，音乐与治疗之间的关系被揭示出来。 俄罗斯在运用音乐疗法方面同样积累了相当多的经验。 同时，在学校，压力的表现仍然是一个严重的问题，这需要制定儿童健康指南。 在这方面，文章分析了在教育过程中使用音乐疗法的可能性，并确定了在这个方向上有效工作的教学条件。 对于这些，除了目的性和一致性外，文章的作者还包括音乐教师中存在必要的普通心理学专业知识的综合体； 发展心理学； 人格心理学； 音乐心理学和音乐教育心理学； 拥有与学生建立联系和信任关系所需的个人素质； 掌握音乐治疗方法（训练、迷幻/沉思/、交际、创造性）以及复杂的音乐能力，以启动学生各种类型的创造性音乐活动。

关键词：音乐艺术、压力条件、音乐疗法、诊断学、学生的情绪状态、注意力、记忆力、思维、神经质水平、焦虑、外向和内向倾向。

Abstract. *In China, two thousand years ago, the relationship between music and healing was revealed in order to correct vital organs and the mental state of a person. Russia has similarly accumulated considerable experience in the use of music therapy. Meanwhile, in schools, the manifestation of stress remains a serious problem, which requires the development of guidelines for the health of children. In this regard, the article analyzes the possibilities of using music therapy in the educational process and identifies the pedagogical conditions for the effectiveness of work in this direction. To these, along with purposefulness and consistency, the authors of the article include the presence of a complex of necessary professional knowledge of general psychology in a music teacher; developmental psychology; personality psychology; musical psychology and psychology of musical education; possession of the necessary personal qualities to establish contact and trusting relationships with students; mastery of music therapy methods (training,*

psychedelic / contemplative /, communicative, creative) as well as a complex of musical abilities to initiate various types of creative musical activity of students.

Keywords: *musical art, stress conditions, music therapy, diagnostics, students' emotional state, attention, memory, thinking, level of neuroticism, anxiety, tendency to extra- and introversion.*

Today, as psychologists note [1-7], more and more children experience severe stress. Children, just like adults, suffer from fears and excessive stress. This problem is so serious that health-saving technologies have become a given of the day. Meanwhile, there are not enough guidelines for their application in the musical education of students, which makes it difficult for a music teacher to work in this direction.

Research problem: what are the pedagogical conditions for the correction of stressful conditions in children of primary school age by means of musical art.

The solution of this problem is the purpose of the study: to theoretically substantiate and test the method of correcting stressful conditions in children of primary school age through musical art.

Object of study: the process of musical education of junior schoolchildren.

Subject of study: methods and methodological techniques for using music therapy in the pedagogical process as a means of correcting stressful conditions in children of primary school age.

Research objectives:

1. To give an essential characteristic of stress and the causes of a person's susceptibility to stressful influences.

2. To consider the historical aspect of the use of musical art in order to correct the mental state of a person.

3. To determine the didactic principles of the use of musical art as a means of correcting the stressful conditions of elementary school students;

4. To develop and test a system of classes for the correction of stressful conditions of children of primary school age by means of musical art.

Research methods:

– analysis of psychological, pedagogical and special literature;

– generalization of pedagogical experience;

– analysis of the educational process through pedagogical observation, conversations with students, teachers and parents;

– experimental and search work, which includes ascertaining, forming and verification stages.

The methodological basis of the study considered the conceptual provisions of scientists and music therapists A.S. Klyuev [8], V.I. Petrushin [9], A.V. Toropova [10].

The study involved a theoretical consideration of the problem and experimental and exploratory testing of the proposed hypothesis. As a result of the theoretical study, the following conclusions were drawn:

1. There are various scientific approaches to understanding stress - a state of tension that occurs in a person under the influence of strong influences. The prerequisite for the creation and wide dissemination of the leading concept of stress, the founder of which was the Canadian biologist and physiologist G. Selye [11], can be considered the increased, especially in the second half of the 20th century and the beginning of the 21st century, the urgency of the problem of human protection from adverse environmental factors.

2. Stressors can be a variety of external factors and emotional factors that affect the emotional sphere of a person.

3. In modern psychology, a distinction has been made between the concepts of "physiological stress" and "psychological stress.

4. For a long time, musical art has been used as a healing factor, it acts as a kind of corrective tool for the emotional state of the individual.

Experimental and search work was carried out by us at the basic school for the practice of the Faculty of Musical Art of the Federal State Budgetary Educational Institution of Higher Education "Moscow State Pedagogical University".

To identify children in a stressful state, or children, due to their individual characteristics, most prone to stress, by talking with parents, a music teacher, we identified changes in cognitive processes (attention, memory, thinking) and students' activities. Along with the conversation and observation, we used the testing method. In particular, the methods of G. Isaac and I. Spielberg were applied, which make it possible to diagnose the emotional state of students, the level of neuroticism, personal anxiety, and the tendency for extra-introversion among the participants in the experimental search work.

Revealing the signs of stressful conditions in junior schoolchildren by observation, we proceeded from physiological, psychological, personal and medical characteristics (changes in pulse, blood pressure, respiration, skin reaction, temperature changes in the body; changes in normal motor activity, cognitive processes).

To carry out the formative stage, we have developed a special technique for relieving stressful conditions in children of primary school age by means of musical art. The lessons were based on:

– the law of the «common emotional sign» L.S. Vygotsky [12], according to which all feelings and emotions tend to be embodied in images corresponding to these feelings, as well as the idea of organizing the artistic and aesthetic environment of L.V. Goryunova, understood as a movement from artistic to artistic, from image to image, from saturation with artistic impressions to the expansion of personal meanings [13];

– understanding of the psychophysical unity of human nature, which implied a complex of influences of the phenomenon of musical art: physiological, emotional, communicative and regulatory.

During the lessons, we used various types of musical activities - both passive (listening to music) and active (musical-rhythmic movements, singing). We considered the psychotherapeutic recommendations of V.I. Petrushin. Taking into account the psychological and age characteristics of primary school age, as well as the individual characteristics of the personality of each child, we selected the musical material of each lesson with special attention. Modeling certain emotions, we took into account the mode, tempo, dynamics and harmony of musical works. Deliberately did not take voluminous pieces of music, avoided pieces with a pronounced change of mood. When developing a system of classes, we took into account the warnings of psychotherapists about the inadmissibility of overloading the central nervous system of children with constantly new information, therefore, for 10 classes, only 3 special complexes were developed that can be alternated at the discretion of the music teacher or guided by the specific emotional state of children on the day of classes.

We considered the planned results of the use of prepared complexes:

– overcoming the signs of stress manifestations in younger schoolchildren: physiological, psychological and personal;

– reconstruction of the cognitive sphere of children and, in particular, the correct assessment of the difficulties that arise in life;

– the awakening of positive emotions in children as a psychological defense force of the body in a stressful situation.

The verification stage was aimed at diagnosing the level of anxiety in children after a series of classes to relieve stressful conditions by means of musical art. At this stage, we used a retrospective method, an appeal to the past in order to determine the decisive influence on the correction of the child's stressful conditions, as well as an analysis of the conditions for the influence of musical art on the qualitative transformation of the psychological characteristics of younger students.

By the method of observation, indicators of an increase in actually experienced positive emotional states, an improvement in the mood of children, an increase in working capacity, and general well-being were recorded. The result of a conversation with an elementary school teacher, in whose class the participants in the experimental search work studied, also indicates a noticeable change in the mental processes of attention, memory, and thinking of students. The children participating in the experimental search work became more attentive in the classroom, their emotional state stabilized, and memory function improved.

The children were tested again, the results of which showed a change in stress tolerance among the participants in the experimental search work.

Comparing the results of the ascertaining and testing stages, it is easy to see that the indicators of neuroticism and the level of personal anxiety have changed for the better. Only 1 out of 10 students remained the same, which indicates the need for systematic and long-term work to correct the mental state of children in a stressful situation.

The results obtained allow us to state:

1. Correction of stressful conditions of children of primary school age by means of musical art will be effective if the following pedagogical conditions are observed:

– goal-oriented and systematic work;

– the music teacher has a complex of necessary professional knowledge of general psychology, and in particular, types of human temperament; developmental psychology; personality psychology; musical psychology and psychology of music education, as well as forms of music therapy (vocal therapy, rhythm therapy);

– possession of the necessary personal qualities to establish contact and trust in working with students in order to correct the stressful conditions of children;

– the mastery of the music teacher by the methods of music therapy (training, psychedelic / contemplative /, communicative, creative);

– the possession by a music teacher of a complex of musical abilities to initiate various types of creative musical activity of students.

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DOI 10.34660/INF.2023.26.60.197
UDC 911.53+930.85(470) + 316.752+711

喀山历史中心社会文化环境改造问题

PROBLEMS OF TRANSFORMATION OF THE SOCIO-CULTURAL ENVIRONMENT OF THE HISTORICAL CENTER OF KAZAN

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抽象的。 这篇文章致力于研究喀山历史中心的社会文化环境改造问题，既涉及更换倒塌建筑物的技术需求，也涉及社会不断变化的社会文化需求。 考虑了城市历史中心和修复目的地中传统与创新相互作用的最有趣的解决方案。

关键词：社会文化环境、转型、改造、历史名城、历史综合体、历史街区。

Abstract. *The article is devoted to the study of the problem of transformation of the socio-cultural environment of the historical center of Kazan, related both to the technical need to replace collapsing buildings and to the changing socio-cultural demands of society. The most interesting solutions of interaction of traditions and innovations in the historical center of cities and restored destinations are considered.*

Keywords: *socio-cultural environment, transformation, renovation, historical city, historical complex, historical district.*

Introduction

The sociocultural environment of the city is fluid, volatile, and the infrastructure of the historical place is short-lived, susceptible to restructuring. The city is constantly growing and changing in accordance with industrial and technological developments. In cities, science, education, art are concentrated. The attention of people in the city is often focused on specific architectural features with an appropriate artistic and historical status and often with a tourist, i.e., commercial appeal. However, a separate, even highly artistic architectural or historical restored monument is not able to «hold» the environment; it is perceived as something alien. The architecture of the city does not exist outside the context - historical, artistic, visual, and natural. The sociocultural environment of the city consists of material and intangible heritage: myths, legends, historical events, military victories or defeats, architectural monuments, religious buildings in various artistic styles. Every city in our perception is always bound by the meanings we give to its streets, houses, gardens, parks, squares. The city is both a reality separate from us and our relationship to it. We readily accept an architectural space that is linked to our past memories, our best days, and we watch with sadness the old streets, houses, parks that were our habitat disappear. All historical cities undergo such transformation, to which the Decision of the Cabinet of Ministers of Tajikistan was assigned the historical center of the city of Kazan [1]. The city with its thousand-year history has undergone many transformations: fires have destroyed up to a third of the city's buildings, and the city has been rebuilt; the revolution of 1917 has equalized the rights of people of all nationalities, so the Tatar settlement line has disappeared, and Muslim places of worship ceased to be perceived as alien in the Russian part of the city; during the transition to a new market social order, noble and merchant mansions, historical buildings and architectural monuments of federal and regional significance in the 1990s of the XX century were demolished as dilapidated dwellings. Therefore, it is very important to consider all the changes that have been made on Wednesday in the historic centre of Kazan in recent years. Without the past, there is no future, and respect for cultural heritage forms citizenship, patriotism and love for the native places where he was born, grew up, where all the most important events in life took place.

Research methods

The main method of research was the inclusion of the observation of the changes that the historical centre of Kazan has undergone in the last 50 years. In addition, the visual context was analyzed - photographs of pre-revolutionary Kazan, architectural structures of the 60s-70s of the XX century, destruction and disappearance of an entire layer of historical buildings in the 90s of the XX century.

Results and discussion

Kazan is one of the oldest cities in Russia, which celebrated its 1000th anniversary in 2005. Historians believe that the city was laid down in the middle ages

to protect the northwestern borders of Volga Bulgaria, a state that existed from the X to the XIV century in the Middle Volga River. Etymology of the name of the city is associated with the word «kazan», which means in Bulgarian language «the beginning of the border, or limit», but there is also a more poetic justification of the name of the city - in Tatar «kazan» means «the boiler» and according to the legend, which guides with pleasure tell to numerous tourists, in the river Kazanka has drowned gold cauldron of Bulgarian khan, on this place and was laid Kazan. This legend in the XXI century will be reflected in artifacts in the form of a cup in different places of Kazan. In particular, in the youngest park in Kazan, opened for the 1000th anniversary of the city. Many mythical characters are used in the park: in addition to a bowl-shaped central monument on the fence, images of a winged serpent of Zilant are scattered, his heads adorn the bowl itself. The dragon snake in the crown is a symbol of Kazan, depicted on the coat of arms and flag of the city. In the Millennium Park, national motives are widely used, the figure of the medieval Tatar poet Kul Gali meets the guests, and this mixing of Russian and Tatar visual culture no longer confuses anyone, as well as the construction of the Kul Sharif mosque on the Kremlin's territory next to the Orthodox cathedrals.

Figure 1. *Fountain "Bowl" in the Millennium Park (today)*
Photo: https://www.tourister.ru/world/europe/russia/city/kazan/parks/24664

In the XV - XVI centuries, on the place of the Volga Bulgaria, the Kazan principality was formed with its capital in Kazan. Kazan was formed on the principle of «concentric zones», formulated as far back as 1925 by Ernest Burgess, the American sociologist [2, p. 257]. According to his hypothesis, the development of the city is accompanied by the formation of concentric zones in which certain political, economic and residential structures are concentrated. The centre is the oldest, usually the political zone, in which the authorities were located, and

houses for representatives of power structures. In Kazan, such a central zone is the Kremlin, which was built on a high hill, originally had an area of 21 thousand square meters. In 1530, the territory of the Kremlin and the settlements around it was surrounded by a wall of log cabins 6 m x 6 m, stuffed inside with earth and stones. In the first half of the 16th century, the number of inhabitants reached 50 thousand, and the area of the city reached 1,500,000 square meters . After the capture of Kazan by Russian troops in October 1552, the wooden buildings of the Kremlin were burned, and in 1556 the construction of white stone walls and the first Christian churches began - the Cathedral of the Annunciation, the Spassky Tower with a gate church. Initially, the tower was two-tiered, square, the thickness of its walls reached 2 meters. The Spasskaya Tower was built as a sentinel and defensive tower, which was emphasized by the cranked passage and the moat in front of it, which was called Tizitsky , it was 6 meters deep and 15 meters wide. This ditch was filled up only in the middle of the XIX century.

Figure 2. *Spasskaya Tower at the end of the XIX century*
Photo: https://russo-travel.ru/landmark/kazan/spasskaya-bashnya

For the construction of the Spasskaya Tower and the Cathedral of the Annunciation, 200 craftsmen were invited from Pskov, headed by Postnik Yakovlev and Ivan Shiryai, so the motifs of Pskov architecture are visible in the external appearance of these structures. This is evidenced by the interpretation of the apses, the ornamental processing of the drums. For long 3 centuries, these monuments determined the cultural image of Kazan, which was built up with cathedrals and houses in the best traditions of Russian and Western architecture. Taras Shevchenko, who was on his way to Kazan in September 1857, wrote in his diary: Kazan very vividly resembles a corner of Moscow both from a distance and close by, at every step you see the influence of the white-stone… [3, p. 38]. Until the beginning of the XX century, the motifs of oriental architecture were used only in the historical region of the Old Tatar settlement, beyond the borders of the Tatars' Pale of Settlement - the Bulak River, so Kazan followed the path of development of the Russian socio-cultural environment until the October Revolution.

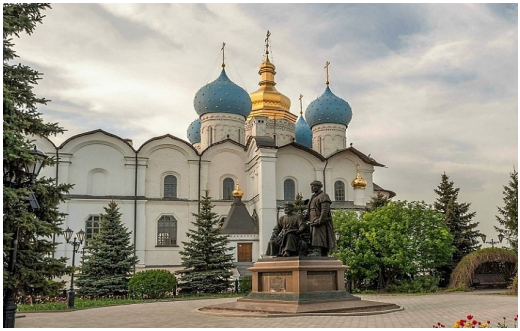

Figure 3. *Cathedral of the Annunciation in the Kazan Kremlin (today)*
Photo: https://rustem-akhunov.livejournal.com/19583.html

In the spirit of the Russian Naryshkinsk Baroque in 1723-1726, the Peter and Paul Cathedral was built, named in honor of Peter I, who visited Kazan in 1722. The cathedral is a two-storey structure on which a quadruple is raised, topped by an eight-player with a face drum and a head. All walls, doors, and windows of the cathedral are decorated with decorative garlands of vines, pears and peaches. Inside the cathedral, an authentic wooden carved iconostasis was preserved, as after the October Revolution, someone guessed to fill the entire space with boards, and in the premises of the cathedral discovered a planetarium with a pendulum of Foucault, proving the rotation of the Earth around the Sun.

Figure 4. *Peter and Paul Cathedral (today) and the iconostasis*
Photo: https://kazantravel.ru/attractions/blagoveshchenskiy-sobor-kazanskogo-kremlya/

Similar architectural masterpieces created Kazan for the fame of the enlightened and cultural capital in the east of the Russian Empire. The establishment of

the Kazan Imperial University in 1804 had a great influence on the formation of the sociocultural environment of pre-revolutionary Kazan. Since then, Kazan has developed not only as a commercial and industrial center, but also as a scientific and educational center. Alexander I signed the Certificate of Approval and Charter on November 5 (November 17 in a new style) 1804, this date and became the birthday of one of the oldest universities of Russia, which played an outstanding role in the development of the national science, education and culture. At that time, universities were creating a cultural space around them, creating an enlightened, creative intelligentsia, as well as a social structure that responded to the needs of a developing society and the challenges of Europeanization of the country. That's what happened to Kazan. Construction of the main building of the university in the style of classicism began in 1822 and ended in 1825 according to the project of the architect P.G. Pyatnitsky.

Figure 5. *Main building of Kazan University (today)*
Photo: https://media.kpfu.ru/sites/default/files/2018-10/_DSC8301.jpg

The city and its architectural appearance began to change with the construction of a complex of university buildings in the same style: a library, an observatory, a scientific chemical laboratory, an anatomical theatre, a physical cabinet, Academician of architecture M.P. Corinthian. This style became dominant in the construction of public and private houses in the historical centre of Kazan until almost the middle of the XIX century. For example, the Rodionov Institute of Noble Girls (now Suvorov School) and the Mariinsky Gymnasium were built in the style of classicism. The architect M.P. Corintsky directed the construction of the Noble Assembly (1845-1853), built on the project of Saint-Petersburg architect N.E.Efimov, a follower of the neo-renaissance and «Russian-Byzantine» style of Constantine Andreevich Thon, author of the Great Kremlin Palace in Moscow, Church of Christ the Savior. The appearance of the Nobility Assembly resembles the Governor's Palace in the Kazan Kremlin, the author of which was K.A.Ton.

Figure 6. *Former Nobility Assembly (photo 2008 of the XX century)*
Photo: https://rustem-akhunov.livejournal.com/19583.html

In the second half of the XIX century, classicism was replaced by neoclassicism, eclecticism, modernity, that is, those styles that arose in Europe, so the architectural appearance of pre-revolutionary Kazan resembled the capitals of European countries.

For example, according to the project of the architect F.Y.Amlong in the beginning of the XX century were built in several buildings: In 1906 - mansion for A.G. Sandetsky, the commander of the Kazan military district general from the Infanteria, in 1902 - mansion for the daughter of I.Apakov,the merchant of the 1 guild.

Figure 7. *A.G. Sandetsky Manor (today)*
Photo: https://avatars.mds.yandex.net/i?id=7560a90c78b037b30e87fe572ae133c8-5572268-images-thumbs&n=13

The project for the house of the commander of the Kazan Military District was attributed to K.L. Myufka, but shortly before his death, Karl Ludwigovich compiled a list of his buildings - there is no commander's house in it [4]; It is believed that the

author was F.Yu.Amlong, the architect who studied at the St. Petersburg Academy of Arts and taught, like K.L. Myufka, at the Kazan Art School. In 1908, K.L. Myufke built a mansion for Zinaida Nikolaevna Vysotskaya, which Alexei Ushkov, the heir to the owners of the Bondyuzhsky chemical plant, ordered as a wedding gift from the most fashionable architect of Kazan. The house of Z. N. Ushkova became an adornment of the historical part of Kazan, and not only in appearance, but also in rich interior decoration: the architect used the best materials, Ural gems, and gilding.

Figure 8. *Mansion of Z.N. Ushkova (today)*

In 1902, F.Yu.Amlong was appointed as the second city architect [5]. Together with the architect Heinrich Rush, they reconstructed the mansion for the daughter of the rich merchant 1 guild I.I.Apakov, built in 1863 and given to her for a wedding with the leader of the Caucasian highlanders Shamil in 1877. The old house was damaged in a fire in 1902, and the owners decided to rebuild it. In the center of the Staro-Tatar Sloboda, a fairy-tale palace with eastern colors grew, intertwined with European motifs.

Figure 9. *Shamil's House (today)*
Photo: https://putidorogi-nn.ru/evropa/1109-dom-shamilya-v-kazani

In 1858, the mandatory use of 'highly approved' standard designs in residential construction was abolished. From now on, anyone could build, in accordance only with their own aesthetic views and tastes [6]. It is necessary to take into account that Kazan by the mid-1980s of the XIX century was the largest city of the Middle Volga region and Ural region. Its population in the 1897 census was 130,000, including 13.2 per cent of the major bourgeoisie, landlords and high-ranking officials; almost as many - 13.3 per cent - well-off petty masters, who included highly paid university teachers, gymnasiums, medical doctors, Lawyers, bank employees, engineers trained by Kazan University [6]. In addition to the Assembly of the Nobility, in Kazan there was the building of the Merchant Assembly, the building of the Assembly of clerks, the building of the theater, opened in 1867. An important event for the formation of the socio-cultural environment of Kazan was the opening in 1895 of the Kazan Art School, which trained painters, sculptors, architects, engravers. Every year, from 60 to 100 people from 29 provinces entered the school. Since 1896, the Art School organized annual exhibitions of the works of its students, sent the best works to an exhibition at the St. Petersburg Academy of Arts, whose graduates came to work in Kazan - these include N. I. Feshin, P. P. Benkov, P. S. Evstafiev, P. I. Abramychev, M. S. Grigoriev. At first, the school did not have its own building; for education, it rented the third floor in the boarding house of Ms. Wagner (now Gorky Street, 3). In the same place, in the attic, the first art exhibitions were held [7]. Especially for the Kazan Art School, K.L. Myufke designed the building, opened in 1902, its appearance was decorated in the popular pseudo-Russian style:

Figure 10. *The building of the Kazan Art School (pre-revolutionary postcard) Photo: https://ru.wikipedia.org/wiki/*

Kazan University also influenced the distribution of publishing activities in the city - on April 19, 1811, the first newspaper «Kazan News» was published. From 1821 to 1833 the magazine «Kazan Gazette», as well as the newspaper «Addition to «Kazan Gazette», in the edition of which N.I. Lobachevsky, the rector of the

University, took part. From 1838 to 1917 «Kazan Provincial Gazettes» were published as the only periodical [8].

One of the urgent problems discussed in the pages of Kazan newspapers was the construction of a water supply system in the city. A joint-stock company for the construction of a water supply system was organized in 1800, but the centralized supply of drinking water to the inhabitants of the city was launched only in 1874. Scientists from Kazan University and the Kazan Medical Institute were involved in the search for sources of drinking water suitable for supplying the city: Butlerov, Boltsani, Mislavsky, Nelidov, and Dr. Los [9]. By 1913, 47 km of water pipes were laid, but residents received drinking water in barrels and buckets from 29 water -folding booths, that is, water did not supplied to the houses, but was delivered, or brought. As of 1 January 1913, the Kazakh water supply system had 1,206 subscribers, of whom 888 used water on a water meter and 318 on a wholesale fee. The average water consumption in 1912 was 365,000 buckets per day. In total, 129, 8 million buckets» [10] were supplied to the city for that year.

Until 1917 there was no central sewerage in the city, it was replaced by cesspits, which served the coachmen with barrels - «golori». It was not until 1928 that the construction of sewerage began in Kazan. By this time, the lack of drainage became intolerable. The main Tatarstan reservoir was introduced on November 17, 1932, but even then wastewater was discharged into the Kazanka River without treatment. The construction of mechanical treatment plants was started in 1953, and finished 10 years later - in 1964, but they provided only about 45% of the required capacity. In fact, 180 thousand cubic cubic meters/day of wastewater was received and 81 thousand cubic meters. [9].

The lack of centralized water supply and sewage in the pre-revolutionary buildings of the historical part of Kazan served as a reason to add these houses to the lists of «dilapidated dwellings», although the good stone houses of Kazan landlords and merchants could stand for not one more decade. In 1995, the Government adopted a national programme to eliminate dilapidated housing. «In Kazan, at the beginning of 1995, out of 31,000 families living in a dilapidated housing stock, 20,000 families, i.e. 62.7 per cent of the total, lived in a dilapidated stock located in the central district of the city» [11]. During the 20 years of operation of this program in the republic 140 thousand people moved from old houses to new buildings that grew on the outskirts of cities. In order to finance this programme, the so-called «old house tax» was introduced in the amount of 1% of the value of the sold goods by all economic entities of the republic. The cities and districts surveyed the entire housing stock and compiled lists of dilapidated houses and determined the number of families living in them.

A total of 8,863 housing units with 45,851 families were included. In 1996, the Republican Stock of Dilapidated Housing received 300 million roubles, but the revenue from payments by Tajik producers grew annually and amounted to about 4 billion

roubles in 2004. During the period of the program a total of 20 bln 600 mln rubles [11]. However, the authorities did not take into account that these houses from the old list are of historical and cultural value, that they were built on the projects of the best architects, Kazan, Russian, and foreign. The historical part of Kazan is 552 monuments, of which 119 are of federal importance, 370 are republican and 63 are local. At that time, 237 cultural heritage sites were in municipal ownership, 37% of them needed urgent restoration, which required 4.5 billion rubles - half of the city budget, and the city authorities could not afford such expenses [12, p. 18].

The first transformation of the sociocultural environment of the historical part of Kazan took place after the revolution of 1917 and the end of the civil war. The separation of church and state has led to the closure and destruction of many religious Orthodox and Muslim shrines. The Church of the Holy Mother of Kazan was destroyed, in the Catholic church students of the Aviation Institute conducted practical classes in the wind tunnel, in the Orthodox Church of Varvarina for students of the Chemical-Technological Institute held workshops, In the Lutheran church the sports hall of the society «Dynamo», and in the Annunciation Cathedral - the state archive. In «Shamil House» and mansion of Z.N.Ushkova organized communal apartments, but these buildings at least did not destroy, whereas under the program of relocation from dilapidated dwellings to well-designed apartments were burned down, destroyed, dozens of stone and wooden houses from the city map. Only on the former Sverdlov Street (now Saint Petersburg Street) 50 monuments of architecture of different period were destroyed. Before the celebration of the 1000th anniversary in 2005 (the demolition program ended in 2004, then it was transformed into a social mortgage program) old houses in the city were demolished by whole quarters, streets. In 10 years old two-storeyed stylish Kazan disappeared, on the place of demolished houses began to build residential houses, public buildings that do not represent any artistic value:

Figure 11. *Residential buildings on Bolshaya Krasnaya Street (today)*
Photo: http://history-kazan.ru/kazan-vchera-segodnya-zavtra/peshkom-v-istoriyu/ekskursionnymi-marshrutami/4647-752

Here, for example, how the fate of the house on Bolshaya Krasnaya Street, house number 10, built in 1830 , in which the mayor Platon Sukhanov lived, has developed over the past 50 years:

Figure 12. *House No. 10 on Bolshaya Krasnaya Street in the 1950s and in 2004*

Figure 13. *House No. 10 on Bolshaya Krasnaya Street in 2017*
Photo: http://history-kazan.ru/kazan-vchera-segodnya-zavtra/peshkom-v-istoriyu/ekskursionnymi-marshrutami/4647-752

Summary

The concept of the historical center of the city is the most complex, subtle category. It is most often used to refer to the preserved part with pre-revolutionary buildings representing significant architectural value. It is this centre that attracts tourists, is told about by guides and is entered in the registers of cultural monuments. As a rule, houses in historical quarters were built in a certain style, popular at one time or another, so it is so important that it is perceived as a whole organism, as a unique «person» of the city. It therefore requires a special regime of legal protection against encroachments by developers and unsuitable restorers. In Kazan, the historical center lost a considerable number of its unique architectural monuments of the pre-revolutionary period, but the city authorities managed

to stop the mindless destruction of «dilapidated dwellings», found an opportunity through the mechanism of private-municipal partnership [13] To renovate and rebuild some unique buildings according to old designs, such as a house in the classical style of the former city head Platon Sukhanov, the destroyed cathedral of the Kazan Divine Mother under the walls of the ancient Kremlin.

Conclusion

The preservation of cultural heritage in ancient cities requires the development of special techniques and mechanisms to preserve architectural evidence from past eras, sources of information on the origin and development of urban culture. Today in the Republic of Tatarstan there are more than 1,500 objects of cultural heritage on State protection, about 4,000 objects of cultural heritage have been identified and about 15-20 new objects are identified each year. February 7, 2017 on the base of Kazan Federal University opened the Information and Education Center «World Cultural Heritage», which unites scientific-educational and academic structures of Kazan and cities of Russia [13]. The Centre carries out educational, scientific and methodological activities for the preservation of cultural heritage in the Republic of Tatarstan in accordance with world standards defined by UNESCO.

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DOI 10.34660/INF.2023.64.71.198

睦邻友好是强有力的地方自治政府的基础
GOOD NEIGHBORLY RELATIONS AS THE BASIS OF STRONG LOCAL SELF-GOVERNMENT

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抽象的。 文章讨论了睦邻关系对于地方自治政府有效运作的重要性。 作者提请注意相邻领土之间的合作和相互理解有助于经济、社会领域和环境安全的发展。 这篇文章提供了基于睦邻关系的成功项目的例子，并描述了地方当局在这些项目实施中的作用。 作者强调，保持邻近地区的良好关系，是实现地方自治目标、为人民生活和发展创造良好环境的关键因素。

关键词：邻近地区、睦邻友好、沟通、社会资本、相互尊重。

Abstract. *The article discusses the importance of good neighborly relations for the effective functioning of local self-government. The author draws attention to the fact that cooperation and mutual understanding between neighboring territories contributes to the development of the economy, social sphere and environmental safety. The article provides examples of successful projects based on good neighborly relations and describes the role of local authorities in their implementation. The author emphasizes that maintaining good relations between neighboring territories is a key factor in achieving the goals of local self-government and creating a favorable environment for the life and development of the population.*

Keywords: *neighboring territories, good neighborliness, communication, social capital, mutual respect.*

Good neighborly relations are the basis for building bridge social capital. This is confirmed by many proverbs that speak of the importance of living in peace and harmony with neighbors. For example, “Neighbors are closer than relatives”, “Do not offend neighbors”, “Living in harmony with neighbors is the key to a good life”, “Neighbors can be best friends”, “It is better to have good neighbors than distant relatives”, “ The neighbor’s chicken always seems bigger than their own.”

Good neighborly relations are an important value for sociology, as they are one of the fundamental elements of social life. Good neighborly relations between people create a favorable atmosphere in society and contribute to its development.

Good neighborly relations contribute to the formation of trust and respect between people, which in turn increases the level of social stability and security. Mutually beneficial relationships between neighbors can also lead to the creation of strong communities that can solve common problems and protect their interests. Sociologists who have studied the impact of good neighborly relations on the health and well-being of people note that good relations with their neighbors increase happiness and life satisfaction.

Based on the analysis of scientific literature on good neighborliness, we propose the following concept of the definition of the term "good neighborliness in a sociological focus", sharing the definition of the sociologist U.A. Vinokurova, "neighborhood in the sociological context as a form of socio-territorial relations with a wide variety of psychological images, meanings and values, as well as strategies and mechanisms for constructing neighborly relations at the level of civilizations, states, peoples, communities and interpersonal relations."

In the article by Andreeva I.V. "Good neighborly relations as a factor in the sustainable development of the state" the author emphasizes that good neighborliness is an important factor in ensuring peace and security in the region, and also contributes to the improvement of economic ties and cultural exchange between neighboring countries.

Many countries celebrate neighbors' day on the last Sunday of May, which was coined by the Parisian Antanas Perifan in the last century. Since then, the holiday has become international and annually gathers more than 30 million people in almost 40 countries. Celebrating the Day of Neighbors is quite simple - just notify others, gather in a convenient place and spend time in good company. In Russia, the holiday is celebrated in 82 regions, where almost 150,000 activists organize events for more than 13 million neighbors. Good neighbors are valued not only by residents, but also by management companies in the housing and communal services sector, which actively support the contingent they serve. Big business also takes an interest in good neighbors and supports them, for example, with sports equipment and playgrounds in new buildings.

At the end of 2022, the All-Russian Congress was held in Russia, organized by the Public Chamber, dedicated to the development of friendly relations between neighbors. Its resolution notes that good neighborly relations are the basis of successful local self-government. The Congress called on citizens, authorities and public organizations to work together to create a favorable environment for the development of good-neighborly relations on the ground. Strong local self-government can only be achieved if there are good relations among the inhabitants. When people care about each other and their environment, they are ready to work together towards common goals. This could be improving infrastructure, providing security, or supporting local businesses. All this is possible only if there is trust

and solidarity among the inhabitants. Good neighborly relations also contribute to the resolution of local conflicts. When people know each other better, they can more easily compromise and solve problems without violence and aggression. It is important to note that good neighborly relations do not arise by themselves. They require efforts on the part of all residents, as well as support from authorities and public organizations. It is necessary to hold events to get to know the residents, to organize public works and holidays that unite people. Thus, good neighborly relations are the basis of successful local self-government. By celebrating the International Day of Neighbors, we can emphasize the importance of developing good relations between residents and promoting the idea of strong local self-government.

Other positive examples of good neighborly relations include the following: Garden in the City is a project that brings together residents of urban areas to create a community garden in the area. Residents agree on a place, choose plants and take care of the garden together. "Language Skills Exchange" is a project that connects people of different nationalities and helps them learn each other's languages, the "Good Deeds" project is a project that involves helping people in need. Residents can provide assistance in the form of buying groceries, cleaning yards, and helping with paperwork. The Book Clubs project is a project that brings together people who are interested in reading. Residents can discuss books, hold literary evenings, and even organize book exhibitions in the neighborhood. "Sports Clubs" is a project that allows residents of the area to play sports together. People can play football, volleyball, basketball, and other sports in parks or sports fields in the counties.

In accordance with Article 1 of the Law on Local Self-Government dated 06.10.2003 No. 131-FZ, the legislation on local self-government provides for the possibility for the population, directly or through local self-government bodies, to resolve issues of local importance.

The CSD study showed that in our country the level of bridging social capital is extremely low and the level of bonding social capital is very high, which means that we trust only close relatives and do not trust strangers[1].

Only 22% of people interviewed by the CSR experts said they could believe most people. For comparison: in Sweden the level of trust in others is 60.1%, in Germany - 44.6%, in the USA - 34.8%, in South Korea - 26.5%, in Turkey - 11.6%. Scottish researcher Richard Rous, who has been measuring social capital in Russia for many years, is convinced that Russians are ready to unite and help each other to protect against environmental imperfections, but are not able to unite to improve it.

Social capital has an impact on economic growth, the well-being of society, the quality of education and health care, living standards and security. It also promotes

[1] Law on local self-government dated October 6, 2023 No. 131-FZ // Collection of Legislation of the Russian Federation.2003 No. 40;

the self-organization of people to solve social problems without the participation of the state. Bridging social capital begins with good relations between neighbors.

Good neighborly relations between residents of the same locality or neighboring territories are important for the development of local self-government, for example:

1. *Creation of a single community*. When residents of neighboring houses or streets know each other and maintain good relations, they are ready to unite to solve common problems and tasks. Thus, a unified community is created that can better cope with challenges and resist negative phenomena;

2. *Joint projects*. Good relations between neighbors' help create joint projects and initiatives that can be beneficial for the entire community. For example, it can be the improvement of courtyards or the organization of sports events;

3. *Improve communication*. When people know each other and communicate, this contributes to better communication between residents and local authorities. People can voice their concerns and ideas, and local authorities can better understand the needs and interests of residents.

4. *Increasing the level of trust*. Good relations between neighbors increase trust and reduce conflict. This can help local governments manage the community and solve problems more effectively, as people will be more likely to support their decisions.

Thus, social capital is of great importance for the development of society and the improvement of the quality of life of people. Bridging social capital, based on good relations between people, contributes to the creation of a strong and united community, ready to solve social problems without the participation of the state.

Chernysheva T.V. in his article "Good neighborly relations and their significance for international security", it is noted that good neighborliness contributes to improving economic development and expanding trade relations between states, as well as the key role of local authorities in the development of good neighborly relations[2].

Local authorities play a key role in the implementation of good neighborly relations between neighboring territories. They can:

1. To create forums for communication and cooperation between residents of different areas;
2. To organize events aimed at strengthening ties between neighboring territories, such as festivals, competitions, sports events, etc.;
3. To develop and implement projects that may be useful for neighboring areas, such as the construction of roads, public spaces, etc.;
4. To conduct consultations and training on issues related to the management of the territory in order to help in solving common house issues;

[2] Chernyshova T.V. 2017 Good neighborly relations and their significance for international security. Bulletin of the Moscow State Institute of International Relations, (1), 105-112.

5. To assist in the creation of agreed rules and norms of behavior that allow neighboring territories to live together in peace and harmony;
6. To use local media to disseminate information about good neighborly relations and exchange of experience between neighboring territories;
7. To provide financial and other support for projects that contribute to the improvement of good neighborly relations.

Sociocultural factors include various informal institutions associated with values and attitudes that are shared by society and change slowly over time. They influence the formation of social capital and relations between people, as well as economic growth, the well-being of society and the quality of public administration. In Russia, the low level of trust in strangers is a problem that can lead to errors in managerial decision-making. However, developing good neighborliness and increasing the level of trust can help solve local problems and make life around you better. To do this, it is necessary to learn how to cooperate to achieve common goals and take into account the differences in bridging and bonding social capital in different regions of Russia.

Recommendations for the development of good neighborly relations:

1. Creation at the federal level of a program to develop good neighborliness and increase the level of trust in society. This program may include activities to raise public awareness of the benefits of good neighborliness, campaigns to encourage people to participate in community events, and create conditions for the exchange of experience and knowledge.
2. Development of legislative acts that would stimulate the development of good neighborly relations. This may be the introduction of tax incentives for organizations that contribute to the development of good neighborliness, as well as the creation of a fund to support projects aimed at developing good neighborliness.
3. Conducting regular surveys of the population to identify problems in relations between neighbors and, based on the results of the surveys, the development of specific measures to improve the situation.
4. Creation of mechanisms for resolving conflicts between neighbors, for example, the establishment of dispute resolution centers or mandatory participation in mediation before litigation.
5. Conducting public hearings before making decisions that may affect the interests of neighbors in order to take into account their opinion and prevent possible conflicts.
6. Introducing compulsory education in good neighborly relations and increase the level of trust in the school curriculum and the training program in public administration.

7. Creation of conditions for the active participation of citizens in decision-making at the local level, for example, through the creation of local councils or advisory committees.

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DOI 10.34660/INF.2023.34.69.199

德语和俄语童话语言的词汇和句法特征
LEXICAL AND SYNTACTIC SPECIFICS OF THE LANGUAGE OF GERMAN AND RUSSIAN FAIRY TALES

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抽象的。 这篇文章分析了德语和俄语童话语言的词汇和句法特点，其文本与其他文学文本的不同之处在于异常高度的连贯性，同时保留了民间语言的表达特征。 已经确定童话故事有其自己的一套语言手段，能够传达其文本的体裁特异性以及民族和文化风味。 得出的结论是，语言手段系统包括范围广泛的用于描述童话故事和魔法过程的语言和言语手段。 童话句法的特点是存在大量具有许多从属结构的复杂句子。

关键词：语言手段系统，童话，动机，社会环境，声音流，童话句法，复合句。

Abstract. *The article analyzes the lexical and syntactic specifics of the language of German and Russian fairy tales, the texts of which differ from other literary texts by an unusually high degree of coherence, while retaining the expressions characteristic of folk speech. It has been established that a fairy tale has its own set of linguistic means, capable of conveying both the genre specificity of their texts and the national and cultural flavor. It is concluded that the system of linguistic means includes a wide range of linguistic and speech means used to describe a fairy tale and the process of magic. The syntax of the fairy tale is distinguished by the presence of a large number of complex sentences with many subordinate constructions.*

Keywords: *system of language means, fairy tale, motive, social environment, sound flow, fairy tale syntax, complex sentence.*

A fairy tale was composed of tales, tales, legends and is a special genre of an epic nature, related to oral or written folk art. Realized mainly in prose form, the text is based on fiction, reflects the national identity of the people through a system of linguistic means, symbols, characters and semantic spaces. The question of the

role and functionality of phonetic, grammatical and syntactic phenomena in the language of a fairy tale in the original and in the translation was touched upon, practically, rather narrowly. Linguistic analysis of German and Russian fairy tales indicates that at the phonological level a special place is occupied by combinations and alternations of sounds in a syntagmatic sequence, which, in combination with other means, form various stylistic sound effects. Including the polyphony of the fairy-tale world, where objects can *rütteln sich and schütteln sich, jammern and weinen*, streams, fountains, trees and bushes echo in different voices. In linguistics, there are several ways to organize the sound flow: *alliteration and onomatopoeia*. Alliteration is one of the types of repetition of sounds, namely consonants, as a rule, at the beginning of words, and vowels attached to consonants can also be repeated, but not at all necessary, for example: *Danach ging es weiter und kam zu einem Baum, der hing voll Äpfel, und rief ihm zu: „Ach,* ***schüttel*** *mich,* ***schüttel*** *mich, wir Äpfel sind alle miteinander reif." Da* ***schüttelte*** *es* (das Mädchen – A.P.) *den Baum, dass die Äpfel fielen, als regneten sie, und* ***schüttelte****, bis keiner mehr oben war…* [Brüder Grimm. Frau Holle]. / *Пошла она* (Девочка – А.П.) *дальше и пришла к дереву, и было на нем полным-полно яблок, и сказало ей дерево: «Ах, отряхни меня, отряхни, мои яблоки давно уж поспели!» Она начала трясти дерево, и посыпались, словно дождь, яблоки наземь, и она трясла яблоню до тех пор, пока не осталось на ней ни одного яблока [*Transl. G. Petnikov*]*. In this example, the repeated use of the verb *schütteln* evokes in the reader's mind the sound effect of leaves rustling and falling apples. At the same time, do not confuse alliteration with other types of repetition, which involves the repetition of only the same or similar consonants, but not words or phrases, for example: «Kind und Kegel», «Stock und Stein», «Dach und Fach» и т.д.: *…und als der Regen stärker ward, und endlich so stark, als ob man mit Mulden vom Himmel gösse, schwang er den Degen immer schneller und blieb so trocken, als säß er unter* ***Dach und Fach*** [Brüder Grimm. Die drei Brüder]. / *Дождь пошел сильнее и, наконец, обратился в ливень, который лил как из ведра, а фехтовальщик все быстрее и быстрее вращал шпагою над головой и остался сухохонек, словно под крышей стоял* [Transl. G. Petnikov].

Another way to organize the sound flow is onomatopoeia. Being one of the powerful expressive means of the language, onomatopoeic vocabulary is widely present in the texts of fairy tales. Onomatopoeic are not only those words that are felt as such by modern native speakers, but also those in which this connection was weakened in the course of the development of the language. It should be noted right away that German onomatopoeia, which are phonetically similar, are mostly ambiguous and cannot act as such in Russian and vice versa. Moreover, even within the framework of a single language, the same word qualifies in terms of relation or non-reference to onomatopoeic words in different ways, for example, the

verbs *jaulen / выть, завывать, kichern / хихикать, muhen / мычать, schnurren / гудеть, жужжать, wiehern / ржать* and a number of others, which the German dictionary "Deutsches Universalwörterbuch" [6] interprets as onomatopoeic with the mark lautmalend, at the same time, the 6-volume dictionary "Wörterbuch der deutschen Gegenwartsspra-che" [7] edited by R. Clappenbach and V. Steinitz does not give such a litter. Pronunciation discrepancies of onomatopoeic words in German and Russian languages can, apparently, be justified by the peculiarities of the phonetic system of each of them, the specifics of the culture and geographical environment of their speakers, the presence or absence of certain sounds in the phonological system of the German or Russian peoples, as well as the difference the ways in which the development of linguistic reality was carried out, for example: *Am andern Tage, als sie mit dem König und allen Hofleuten sich zur Tafel gesetzt hatte und von ihrem goldenen Tellerlein aß, da kam,* ***plitsch platsch****,* ***plitsch platsch****, etwas* (Der Frosch – A..P.) *die Marmortreppe heraufgekrochen* [Brüder Grimm. Der Froschkönig oder der eiserne Heinrich]. / *На другой день она села с королём и придворными за стол и стала кушать из своей золотой тарелочки. Вдруг – топ-шлеп-шлеп – взбирается кто-то* (Лягушка – A.P.) *по мраморной лестнице…*[Transl. G. Petnikov]. As a result, in the languages of the world, dogs bark, cats meow, even money rings differently, for example: *Als der Daumerling nun seine Arbeit von neuem anfing, hörten sie das Geld drinnen sich regen und klingen klipp, klapp, klipp, klapp* (Brüder Grimm. Daumerlings Wanderschaft). / *Когда же Мальчик-с-пальчик снова принялся за работу, часовые и точно услышали, что кто-то ворошится в деньгах за дверью и деньги позвякивают: клинь-клянь, клинь-клянь…* (Translated by G. Petnikov).

There are also cases when one of the languages does not have the original word denoting the sound itself, but there is a verb, for example, in German there is no onomatopoeia for a cat's purr, but there is a verb *schnurren / мурлыкать,* there is also no onomatopoeia for a horse's neigh, but there is a verb wiehern / *ржать*, in Russian and German there is no onomatopoeia for the roar of an elephant, but there are verbs*:* germ. *trompeten* and rus. *трубить*, *реветь: …und als es* (Das Mädchen – A.P.) *in den Hof kam, saß der Hahn auf dem Brunnen und rief: «Kikeriki, Unsere goldene Jungfrau ist wieder hie»* [Brüder Grimm. Frau Holle]. / *И только она* (Девушка – A.P.) *вошла во двор, запел петух, он как раз сидел на колодце: Ку-ка-ре-ку!* [Trans. by G. Petnikova]

According to our observations, moods and modal verbs play the main role in the texts of German fairy tales, while in Russian translations they often correspond to modal words and particles. These discrepancies go beyond the scope of lexical relations and turn out to be essential for the construction of statements, for example: *Die alte Frau aber rief ihm nach: «Was fürchtest du dich, liebes Kind? Bleib bei mir, wenn du alle Arbeit im Hause ordentlich tun* ***willst****, so soll*

dir's gut gehn. Du ***musst*** *nur achtgeben, dass du mein Bett gut machst und es fleißig aufschüttelst, dass die Federn fliegen…»* [Brüder Grimm. Frau Holle]. / *Но старуха крикнула ей вслед: «Милое дитятко, ты чего боишься! Оставайся у меня.* ***Если ты будешь хорошо исполнять*** *у меня в доме всякую работу, тебе будет хорошо.* ***Только смотри****, стели как следует мне постель и старательно взбивай перину, чтобы перья взлетали…»* [Transl. by G. Petnikov]. In this case, the type of modal relation in Russian is not named, but is only implicitly visible on the basis of syntax. One of the most typical correspondences of German modal verbs in Russian translations of fairy tales, according to our observations, can be considered predicative words of the modal meaning "*can, must, must, must not*" and modal words "*possibly, of a surety, probably, perhaps, really, doubtfully, of course* » and so on, for example: *Als der Zwerg sich von dem ersten Schrecken erholt hatte, schrie er mit einer kreischenden Stimme: „Konntet ihr nicht säuberlicher mit mir umgehen?"* [Brüder Grimm. Schneeweißchen und Rosenrot]. / *Не успел карлик прийти в себя от испуга, как начал кричать своим визгливым голосом:* «*Разве нельзя было обращаться со мной повежливее?»* [Trans. by G. Petnikov].

The correspondence of German modal verbs and Russian modal words in the texts of fairy tales is especially clearly seen when expressing an assumption, for example: *„Ich sehe, das geht nicht», sprach der Mann, «spinn lieber, vielleicht kannst du das besser"* [Brüder Grimm. König Drosselbart]. / «*Ну, я вижу, что это дело у тебя нейдет на лад, – сказал муж, – и лучше уж ты примись за пряжу; может быть, прясть ты можешь лучше, чем плести…»* [Trans. by G. Petnikov].

Our observations indicate that the varied content in the texts of fairy tales is embodied by a very limited number of German modal verbs. In the texts of their Russian translations, the presence of a large group of such verbs as *мочь, уметь, хотеть, намереваться, собираться, любить, (не) терпеть, запрещать, разрешать, полагаться, испытывать необходимость, быть в состоянии, быть способным, быть призванным*, at the same time, verbs are used mainly in the third person: *пришлось, довелось, вышло, посчастливилось, получилось, удалось, сорвалось* and many others, for example: *Es waren ihrer dreizehn in seinem Reiche, weil er aber nur zwölf goldene Teller hatte, von welchen sie essen sollten, so musste eine von ihnen daheim bleiben* [Brüder Grimm. Dornröschen] / *Этих колдуний в том королевстве было тринадцать, но так как у короля было только двенадцать золотых тарелочек, на которых им* ***полагалось подавать кушанья****, то одну из них* ***пришлось*** *не приглашать* [Trans. by G. Petnikov]. While in one language there is a refinement of modal meanings, another language dispenses with their special expression. There are also many examples when the modality expressed in the original by a modal verb remains unexpressed in the Russian version, for example: „*Was soll daraus werden?"*

sprachen sie (Die Kriegsleute – A.P.) *untereinander, „wenn wir Zank mit ihm kriegen und er haut zu, so fallen auf jeden Streich siebene. Da kann unsereiner nicht bestehen“* [Brüder Grimm. Das tapfere Schneiderlein]. / *«**Чего тут ждать хорошего**? – говорили они* (Королевские ратники – А.П.) *между собою. – Ведь, чего доброго, коли мы с ним поссоримся да он на нас накинется, так от каждого взмаха семерых как не бывало! **Где же тут нашему брату с ним тягаться**?»* [Trans. by G. Petnikov]

Much brighter and wider differences between the statement, reality and the one who explicates it, are expressed in the language of the fairy tale through *modal* words. An analysis of the texts of fairy tales allows us to note that with the same objective modality transmitted by grammatical means, a sentence-utterance may contain a different subjective modality, the clarification of which actually gives the key to recognizing the pragmatic plan of the utterance, for example*: …aber der Starke packte sie* (Die Tonne – A.P.) *mit einer Hand, steckte sie in den Sack und sprach: „Warum bringt ihr nicht gleich mehr, das deckt ja kaum den Boden“* [Brüder Grimm. Sechse kommen durch die ganze Welt]. / *…а наш силач ухватил ее одной ручищей, сунул ее преспокойно в мешок и спросил:* «*Зачем же вы сразу-то не притащите побольше, ведь эта бочка в моем мешке чуть донышко прикрыла*» [Trans. by G. Petnikov]. In the above example, a shade of uncertainty is present in the subjective opinion of the strong man, due to the fact that you need to take several barrels of gold at once, and the contents of one barrel are very small and it covered only the bottom of his bag. In Russian translation, to convey this modal shade, it is enough just to have a component *едва, слегка, чуть*. In the following example, the modal word *unmöglich* manages to emotionally express the Cat's strong doubts about the Giant's abilities*: „Ich habe gehört, dass du dich in jedes Tier ganz nach deinem Belieben verwandeln könntest; was einen Hund, Fuchs oder auch Wolf betrifft, da will ich es wohl glauben, aber von einem Elefant, das scheint mir ganz unmöglich, und deshalb bin ich gekommen, um mich selbst zu überzeugen“* [Brüder Grimm. Der gestiefelte Kater]. / «*Меня уверяли, – сказал кот, смело шагнув в залу и поздоровавшись, – что вы умеете превращаться в любого зверя. Ну, например, во льва или слона...»* [Trans. by G. Petnikov]. The degree of assumption in the authenticity of the statement in the texts of fairy tales is also represented by modal words like: *hoffentlich, vermutlich, vielleicht, voraussichtlich, möglich, wahrscheinlich, scheinbar*. In Russian texts of fairy tales, there is a frequent repetition of definitions: *добрый конь; серый волк; красная девица; добрый молодец*, as well as combinations of words: *пир на весь мир; идти куда глаза глядят; буйну голову повесил; ни в сказке сказать, ни пером описать; скоро сказка сказывается, да не скоро дело делается; долго ли, коротко ли…*, for example: *Король дал за дочкой богатое приданое, наградил зятя большим чином и задал пир на весь мир* [Magic Ring].

The language of Russian fairy tales is also characterized by the use of nouns and adjectives with various diminutive suffixes *мал-еньк-ий, брат-ец, петуш-ок, ал-еньк-ий, бёл-еньк-ий, зел-ёненьк-ий; сестр-иц-а, Алён-ушк-а, хозя-юшк-а, зёрн-ышк-о, солн-ышк-о, Кат-енък-а, доченьк-а*, *солн-ышк-о* and others. The presence of a number of individual words and expressions in the texts of fairy tales especially clearly reflects their lexical features: *жили-были, не ленились, трудились, пахали, засевали, напасть, затужили, загоревали, утешают, не горюйте, биться насмерть, не тосковать, удерживать, отговаривать, снарядили, мечи булатные, котомки, хлеб-соль*, etc., for example: *Жили-были себе царь и царица; у них были сын и дочь, сына звали Иванушкой, а дочь Аленушкой* [Sister Alyonushka and brother Ivanushka].

A syntactic analysis of German and Russian fairy tales shows that simple sentences in them are represented by a significant corpus, but most of them are written in complex sentences with a pile of numerous synonyms, additions, repetitions that reflect a similar complexity and interweaving of thoughts in the heads of characters, for example: *Die Frau Holle sagte: „Es gefällt mir, daß du wieder nach Haus verlangst, und weil du mir so treu gedient hast, so will ich dich selbst wieder hinaufbringen“* [Frau Holle]. / *Госпожа Метелица сказала:* «*Мне нравится, что тебя тянет домой, и так как ты мне хорошо и прилежно служила, то я сама провожу тебя туда»* [Trans. by G. Petnikov].

An examination of simple and complex sentences in the language of German and Russian folk tales shows that a simple thought is expressed mostly by a simple sentence, a complex one - by various combinations of simple sentences connected to each other according to certain grammatical rules, i.e. complex sentences, where, naturally, a prompt and a question or message are combined. Simple sentences, most often incomplete, are especially typical of dialogic speech, which is a combination of replicas or a unity of questions and answers. The dialogues of fairy tales are live dialogues that convey the natural intonations of the speakers, perfectly imitating the cunning speech of a peasant, stupid, with arrogance, the speech of a master, the flattering speech of a fox, etc. The complexity of the specific construction of complex sentences in the language of fairy tales has been emphasized by many linguists. For example, V.N. Migirin [7], who used the fairy tales of the storyteller Abram Novopoltsev in the notes of D.N. Sadovnikov, drew attention to cases of combining statements that are far in meaning in one complex sentence, as a characteristic phenomenon for the language of fairy tales [6]. At the same time, the author considers in sufficient detail all types of connections in complex sentences, distributing them, ultimately, into the following types:

- non-union complex sentences, for example: *Da packte sie der Diener gleich beim Kragen, trug sie in die Küche und sprach zum Koch: „Schlachte doch diese ab, sie ist wohlgenährt“* [Die weiße Schlange]. / *Схватил слуга утку тотчас за шею, принес ее на кухню и говорит повару:* «*Зарежь мне эту утку, видишь – какая она жирная»* [Trans. by G. Petnikov].

- complex sentences, the connection within which is carried out using the unions ***а***, ***и***, ***да***, for example: *Der Diener schlug alles aus und bat nur um ein Pferd und Reisegeld* [Die weiße Schlange]. / *Но слуга от всего отказался и попросил только коня и денег на дорогу…* [Trans. by G. Petnikov].

- complex sentences with a developed subordinating communication system, for example*: Er musste jetzt seine Beine gebrauchen, und als er lange Wege gegangen war, kam er in eine große Stadt* [Die weiße Schlange]. / *Пришлось теперь парню идти пешком; прошел он немало долгих путей и дорог, пока попал, наконец, в столицу* [Trans.by G. Petnikov]. It should be noted at the same time that all types of complex sentences in the studies of V.N. Migirin, are nothing but a reflection of the various stages of their historical development.

Thus, the specifics of the language of the German and Russian fairy tale differs from other artistic texts in an unusually high degree of coherence, and its language has retained the expressions characteristic of folk speech, figurative characteristics, word play and repetitions typical of the style of this genre of oral folk art. The phonetic side of a fairy tale is characterized by the frequent use of such techniques as onomatopoeia, assonance, rhyme, which makes the text melodious. Among the text-forming means of a fairy tale, various ways of word formation are revealed, with the help of which new words, neologisms are created that characterize the characters and realities of the fairy tale space. The syntax of the fairy tale is distinguished by the presence of a large number of complex sentences with many subordinate clauses.

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DOI 10.34660/INF.2023.65.94.200

从巴尔古津针叶林的中国历史

FROM THE HISTORY OF THE CHINESE IN THE BARGUZIN TAIGA

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抽象的。 19 世纪下半叶，中国人在巴尔古津针叶林的出现与金矿开采的发展有关。 作者考虑了世纪之交中国人的条件和生活方式、20 世纪上半叶苏联社会的社会适应、俄罗斯妇女家庭的创建以及她们对苏联社会生活的参与。

关键词：俄罗斯、中国、巴尔古津针叶林、Baunt、金矿开采、中国人、俄罗斯人、社会适应。

Abstract. *The appearance of the Chinese in the Barguzin taiga in the second half of the 19th century was associated with the development of gold mining. The author considers the conditions and way of life of the Chinese at the turn of the century, social adaptation in Soviet society in the first half of the 20th century, the creation of families with Russian women, their participation in the life of Soviet society.*

Keywords: *Russia, China, Barguzin taiga, Baunt, gold mining, Chinese, Russians, social adaptation.*

Barguzin taiga. This was the name of the largest gold mining region in Transbaikalia. The mines of the Barguzin taiga were concentrated along the tributaries of the Vitim River. The beginning of gold mining in the Barguzin taiga dates back to 1844, when the Innokentievskiy (on the Bugarikht river) and Mariinsky (on the Maly Boychikon river) mines arose. However, the real gold rush began in 1857, when placers were discovered in the basins of the rivers Tsipikan and Vitimkan, Sivokon, Sivo, Aunik and others in Baunt (Baunt is part of the Barguzin taiga. Currently Baunt Evenki district).

The history of the appearance of the Chinese in the Baunt is directly related to the history of the development of gold mining. The opportunity to find work and the natural wealth of the Barguzin (Baunt) taiga attracted not only the Russian peasant and craftsman, but also the eastern neighbors (Chinese, Koreans).

As follows from the report of the Vitim-Vitimkan Council of Workers' Deputies to the Central Siberian Executive Committee dated April 21, 1918, before the First World War, there were up to 1,500 Russians in the taiga, mostly workers, and from 3,000 to 4,000 Chinese. "By the time of the first coup d'etat, up to 800 Russian workers remained in the taiga, the rest were taken into the army, and the families left for residential areas. Currently, about 300 people of the Russian population, about 2000 Chinese, remain in the taiga "(Baunt's Golden Treasure 2010: 81). The authors of the report also saw the reason for the decrease in the population in the exorbitant appetites for profit of the owners of the mines.

Before the revolution of 1917, there were 56 mines in the Barguzin taiga, which produced 25-30 poods of gold annually. Of the 56 mines, 40 belonged to Jewish merchants: Frizer, Butlitsky, Novomeisky, Zhidovetsky. The workers were mostly Russians (66%), Chinese and Koreans (25%). The life of the workers was very hard. No wonder mining work was called free hard labor. If in "1917 gold prices reached 42 rubles. for a spool, then it was accepted from the workers no more than 6 rubles. The supplies were bought cheaply, and were sold to the workers at 3 and 4 times the cost. According to the most minimal estimate, in 1917 the gold miners received up to 4 million benefits. Recently, many gold miners, not finding much use from Russian workers, are trying by all means to use Chinese labor, as a more downtrodden race, which has not been touched by the international labor movement, thanks to which they can be exploited, or rather, robbed as you like" (Baunt's Golden Treasure 2010: 81-82).

According to the memoirs of M.A. Novomeisky, a mining engineer, owner and heir to the mines of the Barguzin taiga, gold was mined in the Barguzin district in a primitive way. "In addition to the planned exploitation of new plots, partly in the mine method, partly in open pits, handicraft mining was carried out in the taiga: there the miners worked "on their own", i.e. by agreement with the owner of the mine, they received a certain payment for each reclaimed spool. They were mostly Chinese: every year they came to the taiga in thousands, most from Khankoi" (Hankou? - B.O.) (Baunt's Golden Treasure 2010: 362).

The term of stay of the Chinese in the gold mines of Barguzin was limited to four years. "In their work ... there was a lot of good and instructive. Instructive was the attitude of the old-timers, those who had already worked for several years, to the newcomers. As soon as a Chinese came to the mine (they always came alone, without wives), he immediately received hospitality in one of the barracks where his relatives lived. With the money collected in a circle, the old-timers bought a simple prospector's tool for a beginner: a pickaxe, two or three shovels, a tray, and the like. The Chinese kept and fed the newcomer until he began to earn money on his own. After four years, having accumulated the necessary amount, he began to prepare for his return to his homeland. First of all, he bought a horse, then went to

the taiga and returned debts to everyone from whom he borrowed. Only after that did the Chinese return to their homeland in order to go back to work in a year or two, for another four-year term" (Baunt's Golden Treasure 2010: 363).

"At the pit works that were carried out in winter, most of the foremen were Chinese, experienced prospectors and gold miners. They perfectly mastered the craft of prospecting, had rich experience in gold mining, constantly washed well, constantly had bonds for their daily bread, but they also dressed little and little. The term "little-little" was the main one among the Chinese. Among the Chinese who worked in prospecting work, whether it was pit work, ditches or a cut, to the question "How are you?" there was always one answer: "A little, a little." From them you will not hear, as from the Russian Ivan: "Good or normal." This is the kind of people they are, although in communication and in conversation, it would seem that they are very frank, but in fact they are secretive and with a kind of cunning" (Proskuryakov 2007: 248).

The Chinese practically did not speak Russian, creating closed communities. They came to Russia without wives, so they took Russian women as wives (In Baunt in 1940, one family was recorded, where the wife is a Buryat Darima In Funtan, born in 1909, a milkmaid) (Book of Memory of the Bauntovsky Evenki District 2014: 219). Nevertheless, through Russian wives, the Russian environment, the gradual adaptation of the Chinese in society took place.

By 1937, in the Buryat-Mongolian ASSR, according to the All-Union Population Census, there were 478 Chinese (including 422 men) (Motrevich 2014: 180). In the nominal lists of residents in 1940-1946. In the Baunt aimag (district) (only the adult population is recorded), the names of 117 Chinese are recorded, out of 22 children born in 1917-1929, 17 are recorded by Russians (10 males and 7 females). Their Chinese fathers were born in 1876-1912. (Book of memory of the Bauntovsky Evenk region 2014). The Chinese took the Russian names Vasily, Vladimir, Mikhail, Ivan, Andrey, Alexander, George. Therefore, their children already had Russian names and patronymics.

Among the professions, the Chinese mention a shoemaker, a calculator, a fitter, working promartels (cutter, brick shop worker), manager. production, gardeners, fishermen, laborers, one employee of the district department of the NKVD. Basically, they worked as "gold miners".

Old-timers remember that Ivan Van-min, Volodya Van-Shin, Ivan Lim-bo worked as foremen. "They were wonderful men, craftsmen and professionals of prospecting work. They were respected people in the mines. While extracting gold by the brigade, they regularly paid their share, or, as it was also called, rations. These foremen knew well the areas with a good gold content, so they always knew where to wash gold in winter, and in which - in summer. A purely positive feature of the Chinese foremen was that in case of flood waters or prolonged rains, when

work stopped, they had a reserve for a rainy day. The members of the brigade liked it very much. There was also mutual assistance between the brigades: when one of the brigades had an extremely critical financial situation, they shared their reserves" (Ibid.).

During the Great Patriotic War, the Chinese continued to mine gold, bringing victory closer with their labor. But there were also those who fought. Yandantsun Matvey Matveyevich, born in 1915, fought on the Leningrad Front, went missing in 1944), in Poland - Aleksey Ivanovich Man Zin Binov, born in 1921, officer of the NKVD RO, staff sergeant, commander of a separate reconnaissance company of the 3rd brigade of sailors, died in 1944), Eremin Georgy Innokentevich (Chinese) (1923-1942), private, died near Stalingrad. They fought and returned home Vanmin Alexander Ivanovich (1923-1985), private on the Trans-Baikal Front, Gafa Afanasy Ivanovich (1919-1983), private, Luzenkho Vasily Mikhailovich (1921-1948), sergeant, commander of a 76-mm anti-tank gun, Luzenkho Petr Mikhailovich (1924-1985), Trans-Baikal Front, Nikolai Grigoryevich Yangzhenpin (1927-1989), Guards Sergeant (Book of Memory of the Bauntovsky District 2020: 65, 91, 250, 283, 504). Man Zin Binov Pavel Ivanovich and Van Min Alexander Ivanovich were drafted into the army (there is no other information) (Book of Memory of the Bauntovsky Evenki District 2014: 117, 137, 160).

According to the memoirs of G.I. Kolmakova, who worked during the war years at the mines of the Troitsky mine, among the workers of the mining workshop were the Chinese "San Di-Bo, Olga Li-U-Zu, Alexander Khan-Shi-Syu, Alexander Kon-Zi-Syu, Vladimir Khan-Shi -Xu, Victor Hindun, Malya Chin-Chin-San, Vladimir Hindun, Victor Ka-Ha-Chui, Li Si-Po. ... Remarkable women rolled back the breed ... including Antonida Tsi-Fu-Shi. Fedor Livanshu, Ivan Tsa-Yu-Shin, Vasily Tsyu-Ding-Bo, Ivan Si-Da-Fu worked as samplers" (Proskuryakov V. Golden Baunt is 90 years old 2015: 49).

Most of the Chinese adapted to the Soviet reality ("advised"). Children and grandchildren from mixed marriages received secondary and higher education in the post-war period, worked and are working in various fields. Chinese surnames remained only with men, women, as a rule, switched to the surname of a Russian husband or a mestizo husband with a Chinese surname. Therefore, it can be stated that the descendants of the Chinese who came to Russia at the beginning of the 20th century became full members of Soviet society by the middle of the 20th century.

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DOI 10.34660/INF.2023.26.33.201

分析创新和数字化转型的方法，同时考虑到日益加剧的地缘政治紧张局势和工业 4.0 的到来：对新人类的挑战

ANALYSIS OF APPROACHES TO INNOVATION AND DIGITAL TRANSFORMATION, TAKING INTO ACCOUNT THE GROWING GEOPOLITICAL TENSIONS AND THE ONSET OF INDUSTRY 4.0: A CHALLENGE TO A NEW HUMANITY

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抽象的。 作者考虑了军工联合体未来结构的发展情景，并从现代世界日益加剧的政治不稳定和紧张局势加剧的角度预测了全球军火市场的变化。 他们还分析了工业 4.0 中国家的进一步分布，即即将到来的第七次机器人-人形订单，提出了他们对可能形成一体化联盟和军事货币区的地缘经济分区的看法。

关键词：ADF、俄罗斯、集体西方、工业 4.0、人工智能、大数据、中国、美国、AUCUS、金砖国家、上合组织、欧亚经济联盟、军工联合体。

Abstract. *The authors consider scenarios for the development of future structures of the military-industrial complex and predict changes in the global arms market from the standpoint of increasing political instability and rising tensions in the modern world. They also analyze the further distribution of*

countries in Industry 4.0., the upcoming 7th robot-humanoid order, offering their vision on the geo-economic zoning of the potential formation of integration unions and military-currency zones.

Keywords: *ADF, Russia, collective West, Industry 4.0., AI, Big Data, China, USA, AUCUS, BRICS, SCO, EAEU, military-industrial complex.*

The upcoming 7th robotic-humanoid mode of civilization development, as the basis for the further effective existence of mankind, asks urgent questions about the quality of reproducible "smart" labor resources in the international division of labor (IDL) and their compliance and conjugation in single value chains for goods of high innovative and resource intensive products. This means that the former approaches of the industrial and post-industrial world order are jumping into a single state of harmoniously built cross-border production chains: around the knowledge, resources themselves and the needs of the behavioral economy of Daniel Kahneman and Richard Thaler, causing persistent irrational preferences of individuals in the world of creative industries and increasingly virtualized services and businesses [1;11].

And this means that the division of the world in terms of access to resources and technologies, to scientific schools and to the elements of building new blocks in the system of common standards and regulations within the framework of integration communities such as the SCO, BRICS, APEC and the EU, as well as technological agglomerations of the country or a politically formed community of unity of interests of the Anglo-Saxons or the clans of the ancient aristocracy of Europe will become increasingly rigid. At the same time, they will strive to rebuild the zones of their vitally important interests not only through bloc development like AUKUS, but also through the involvement in these processes of business conglomerates of "black holes" of global management, like the financial groups "Black Rock" or "Wingard", replacing the priorities of state sovereignties with the goals of ubiquitous corporate coercion through a network of netocrats and banksters [2;7].

And it is the futurology of tomorrow, going into the urban chains of closed cycles of megacities, the creation of a symbiosis of the "green agenda" and the genomic dictate of the "civilized person" that force us to reconsider the approaches themselves not only to the consequences of the digital storm of the global digitalization of all technologies and their translation into a set of neural network algorithms of AI systems and Big Data, the Internet of Things and building new areas of virtual and augmented reality, but also make unpopular decisions about the mechanisms of intraplanetary power sharing. Here there is a fine line of marketing saturation of the virtually heated demand of the true demands and needs of the globalized economy and the states themselves, trying to combine the rhetoric of

populism with access to the levers of corporate reformatting of the consciousness of ethnic groups, more and more blinded by emotions and fears of the unknown. This means that a real living person, previously considered from the standpoint of political economy and neoclassical theories, as a subject of private international law, a trendsetter and a consumer of freedoms, a spoiled bearer of the rights and obligations of a social contract between the authorities and a person who does not limit his life in any way, is no longer simply a statistical indicator of various ratings and calculations, but is taken out of the brackets of the world economy itself, which is being heavily lumpenized and criminalized, replacing the concepts of access to resources and real management of "democratically declared institutions of sovereignty", being drawn into the ecosystems of large TNCs and TNBs, being taken out into virtual and drawn metauniverses of various directions. In them, this person, who has not yet completely lost his humanoid features, as the basis of the skills and competencies he accumulates, tries to grow out of himself a whole bush of professional preferences, sell them for a fairly adequate price, comparable to his personal ambitions and beliefs in his uniqueness and infallibility, expressing disagreement with the increasingly ongoing stratification of the rich and the poor, the leaders of the "old" (their leader Bernard Arnault) and "new" (their leader Elon Musk) money, for their own reclaiming a place under the Sun and for safe encapsulation in the niche of social security. And this means that he is actively trying to save his mind and not lose his capacity through the constant stress of growing post-pandemic challenges and professional autarky threats. [3;5] This being is trying to squeeze his concepts of humanism into the Procrustean bed of the degrading reality of transhumanism and dehumanization, which become idols of the coming changes and force him to significantly lower the bar for the quality of life and, in anticipation of hereditary preferences for his children and followers, make concessions the state and its institutions of social management. The destruction of the classical institutions of succession, such as mentorship, a professional community of interests, membership in the guild of artisans of various skills and abilities, is washed away by the desire of the rich who hire it to reduce costs by multiplying it to zero, making it flexible and ready for anything. Namely, it takes the path of its introduction into virtual chains of various agglomerations, embedding in conglomerates devoid of hierarchy, dissolving in meaningless virtual communities and groups of information and propaganda gadgets and ecosystems. All of them together give him an unstable feeling of the constant movement of the earth under his feet, wash out the habits of qualitative preference for the stimuli of a measured life, destroyed by the momentary nature of being and the impenetrability of the inevitable mechanical displacement of all living things from the world around us. Yes, we can observe nature in cities through television panels connected to Wi-Fi network services, increasingly drawing the souls of the last romantics into

the narrow filters of technocratic service to the interests of the matrix, a society of an endless sleepless future, squeezing out the remnants of a biological still living person. And the picture of covid shocks, flaring up smoldering conflicts and the apparent impotence of the state, which is increasingly criminalizing and replacing the original in the struggle for costs with surrogates and counterfeits, still having the value of things and products familiar from the past, sends such a person to the Orwellian / Wellian war with himself or prepares for the collective madness of the wondrous world of the future by O. Huxley, or the utopias of E. Zamyatin or I. Efremov, who do not let the individual understand that he has forgotten ... God and became a cog in the system of self-regulation and self-destruction of Moloch and his adherents. [4;8] In it, only absolute criteria of loyalty to the system, complete dissolution in the matrix and subordination to its interests can guarantee, at least in the visible range, at least some kind of existence and tribal/family reproducibility. And against this background, the flight of the mind to the new worlds of its intoxicants (alcohol, drugs) or gaming metauniverses in the cold of growing madness and chaos gives such a person a chance to self-identify and enter the world of the future... [5;7]

Are we ready for such anti-humanism in the technocratic world of Industry 4.0? Can our integration unions, military blocs or currency zones give us multiculturalism not according to Thilo Saracen, but according to S. Huntington, when the "clash of civilizations" finds an optimum and saves humanity from the "end of history" by F. Fukuyama? [8;12]

What weapon, after the collapse of the common criteria of the international security system that was formed by the end of the 20th century, as well as the explosive growth in the number of participants in the "nuclear club" can give us a chance for quiet creativity and a peaceful life, if the polycentric world is fighting the hegemony of the "world according to -American" and the neo-colonialism of the never-ceasing metropolises, which are already technologically tying, through the services of international TNCs and TNBs, all of humanity to the joys of a simple life: to the right to consume protein and fresh water, to the right to a peaceful life due to conformism to those who forever remain the poor, uneducated and deceived, because there is not enough for everyone and no one is ready to redistribute their loot more effectively and humanistically with those who have been subjected to this violence and today have no chance of a worthy rebuff from the poor to the rich. [9] And this new "white man's burden" fascism deprives the very system of global governance of the moral apparatus that could draw conclusions from the mistakes of the past and use AI and Big Data as the salvation of all through equal access to the technological health of earthlings in their quest to receive their own calories in food and warmth, in the development and maintenance of their family right to a decent existence. And here, no UN Millennium Declara-

tion, after the farce of the Ukrainian war in Ukraine and the planned US aggression on Taiwan, can give any recipes and guarantees to either this average person or any of the nations, since the philosophy of mutual survival and coexistence is determined by the force of arms and the ideology of justice, which only then is it realized in guaranteed ways of a worthy response and the possibility of mutual destruction of the unions of states and institutions of global governance that divide this planet, further maintaining the status quo of the super-rich over the claims of the increasingly impoverished strata of humanity. And therefore, the philosophy of the new world is again beginning to be forged in a slide towards the escalation of those states that again, after two world wars, want to force others to understand themselves and accept the principles and laws of international law equal for all, and not the "rules of the game" of some on misunderstanding and rejection them by others. [10]

How and who will be able to convey this to those who are ready to go to the end, and success for a more just and peaceful world will depend, but it is Industry 4.0 that will win it. [11] should provide both resources, technologies, and the required qualified personnel for appropriate fragmentation and its own national self-determination. [12]

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DOI 10.34660/INF.2023.65.25.001

地名分类问题
CLASSIFICATION ISSUES OF GEOGRAPHICAL NAMES

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抽象的。 文章专门讨论地名的分类，因为虽然研究地名的地名学是一门完整的科学，但在这个问题上没有单一的观点，也没有简单、普遍、逻辑正确的地名科学分类 尚未开发。 不同科学家的地名分类，如 V. Semenov-Tyan-Shansky、A. Selishchev、E. Murzaev、V. Zhuchkevich、S. Basik、Kh。 Khasanov、S. Karaev、P. Gulyamov 进行了分析。 根据这些分类，作者给出了他自己的地名分类版本。

关键词：分类、地名、形态群、语义类型、oronyms、hydronyms、phytonyms、zoonyms、oikonyms、与地点地理位置相关的名称； 与该地点的特定特征相关的名称； 与地形相关的地名； 与气候、气象要素相关的名称； 来自矿物的地名。

Abstract. *The article is devoted to the classification of geographical names, because, despite the fact that toponymy, which studies geographical names, is an integral science, there is no single view on this issue and a simple, universal and logically correct scientific classification of geographical names has not yet been developed. The classifications of toponyms of different scientists, such as V. Semenov-Tyan-Shansky, A. Selishchev, E. Murzaev, V. Zhuchkevich, S. Basik, Kh. Khasanov, S. Karaev, P. Gulyamov, are analyzed. Based on these classifications, the author gives his own version of the classification of geographical names.*

Keywords: *classification, geographical names, morphological groups, semantic types, oronyms, hydronyms, phytonyms, zoonyms, oikonyms, names associated with the geographical location of a place; names associated with specific features of the place; toponyms associated with the terrain; names associated with climate, meteorological elements; toponyms derived from minerals.*

The classification of geographical names is a complex scientific issue. Since geographical names are diverse, beautiful and strange, it is a very difficult task to separate them, to analyze each name in terms of language rules, historical formation and semantics. Toponymic scientists offer different classifications of geographical names, however, due to the lack of a unified view on this issue, a simple,

universal and logically correct scientific classification of toponyms has not yet been developed.

Due to different approaches to the classification of toponyms, many scholars have grouped them into different groups.

According to V.A. Zhuchkevich, the division of geographical names into groups must meet the following requirements: what is called, what objects; how it is called, in what language and by what means of the language; why is it called, what is the meaning of the names?

Regarding the classification of geographical names, E. Murzaev writes: "Since any state or territorial unit has a complex, multi-layered living and changing system of toponymy, it is very difficult and even impossible to create a unified classification of geographical names that meets all the requirements." V.Semenov-Tyan-Shansky, A.Selishchev, V.Nikonov, V.Zhuchkevich, A.Superanskaya also emphasized the need for deep scientific research to create a universal classification of toponyms.

The complexity of creating a universal scientific classification of geographical names is explained by the fact that toponymy is an integral science that arose at the intersection of the interests of linguistics, history and geography. Until now, each researcher has approached this issue based on the purpose and direction of research, therefore, if existing classifications sometimes satisfy toponymist linguists, historians and geographers have objections and vice versa.

Naturally, any classification has both its positive aspects and certain disadvantages, scientific research in this direction should continue, because, as Academician V. Bartold noted, "each researcher discovers what the previous ones did not develop, and at the same time over time, each new interpretation also includes an increase in the number of errors. Who made the most correct interpretations and who made the most mistakes should be left to the future."

The classification of toponyms has its own history. An attempt was made for the first time to scientifically separate geographical names into different morphological groups and semantic types in the 19th century. Various classifications of geographical names were proposed by such scientists as V. Semenov-Tyan-Shansky (1924), L. Gumetskaya (1932), A. Selishev (1939), V. Tashitsky (1946), E. Murzaev (1979), A .Superanskaya (1985). For example, the famous Russian scientist V. Semenov-Tyan-Shansky (1924) classified geographical names into the following groups: from personal names and nicknames; from church holidays; from historical names; from a pagan cult; from ancient tribes; assigned in honor of various events and persons; from objects that make up a typical geographical landscape of a given area [1, p.51].

A.M. Selishchev (1939) divided Russian names into 7 categories: those derived from the names of people and their nicknames; from the names of people

by occupation; on a social and property basis; administration related; reflecting the ethnic character of the population; reflecting the features of the landscape and features of the development of populated areas; with an abstract meaning [1, p.51].

Experts used different factors (linguistic, historical, geographical, social) in the classification of geographical names, and each of them has its own characteristics. Among the proposed classifications, the simplest and relatively acceptable method is the method of E. Murzaev (1979) according to objects of toponymic nomination (oronyms, hydronyms, phytonyms, zoonyms, oikonyms).

Uzbek toponymic scientists also conducted a number of studies on the classification of geographical names. In particular, the merits of Kh. Khasanov should be especially noted, who first expressed the opinion that when dividing place names into types, it would be appropriate to first analyze each name in terms of language rules and stages of formation.

When classifying geographical names, you can make sure that its main types are associated with physical geography:

1. Names associated with the location and specific natural features of the place.
2. Names associated with the geographical location of the place.
3. Geographical names associated with the relief (geomorphonyms).
4. Geographical names associated with climate and weather conditions.
5. Names associated with water bodies (hydronyms).
6. Geographical names associated with plants (phytonyms).
7. Geographical names related to the animal world (zoonyms).
8. Names associated with minerals and rocks.

It should be noted that the group of names reflecting the physical and geographical features of the place occupies a special place among the types of geographical names in terms of their origin.

Geographical names are divided into the following types according to their meaning (semantics):

1. Geographical names associated with the natural conditions of the place (relief, soil, flora and fauna, inland waters, etc.). This group of toponyms is the oldest, because at first people called objects in simple terms: mountain, river, forest. The name conveys the natural conditions and features of the place. Before the arrival of Europeans, the natives of America and Australia gave names associated with the natural conditions of the place to almost all objects. According to V. Zhuchkevich [2, p. 89], 23.5% of the names of Belarusian settlements are associated with the natural conditions of the place, according to historical sources in the 16th century this figure was 35-40%. E. Lyubimova [4, p.13] writes that in the Pskov region, the names associated with the natural features of the area make up 6-8%, and in the XIV-XV centuries this figure was 50-60%.

2. Geographical names associated with socio-economic processes (national composition of the population, labor activity, social status, transport routes, cultural ties, etc.). Although this group of toponyms is younger than the first group, it is also considered quite ancient. In turn, this group of toponyms is divided into the following subgroups: a) names that have arisen in connection with the employment of the population. b) names associated with production and labor activity. c) the names of enterprises located in the settlement. g) names associated with transport routes. d) names reflecting the national composition of the population. e) names associated with the customs of the population, j) names associated with family relations.

3. Names associated with the properties of the object (its size, age, specific characteristics, etc.). Such names are based on the main features of the object, which are different from other objects.

4. Patronomic (patronymic from the Greek πατρωνυμος - "bearing the name of the father") titles, i.e. names associated with the names and surnames of people. They are based on anthroponyms. Such names are mainly the names of social objects, rarely are the names of natural objects - rivers, lakes, mountains, etc. «patronym» is an outdated term in toponymy, introduced by the Czech scientist F. Palecki in 1836 [5, p. 91-92].

5. Migratory names. As the population moved, so did the names. As a result of migration, geographical names undergo partial changes: a) suffixes are added to the names (-chi, -lik, -i, etc.); b) the «new» word is formed as a determiner; c) names appear in a new form. One of the types of name migration is migration from the name of one object to the name of another object, from the name of a river to the name of a city or village. For example, the Chirchik River is the city of Chirchik.

6. Religious or mythical names. Toponyms of this group are not necessarily conditioned by reality, they are conditioned by legends, myths, religious images.

7.Memorial and symbolic names. This group of names includes names associated with great people, heroes, historical events, great discoveries. Such names occupy a significant place in the Arctic and Antarctic.

8. Names of unknown etymology, therefore not belonging to any group. As the science of toponymy develops, such names become less and less.

V. Zhuchkevich divided toponyms into the following groups depending on the language they belong to [2, p. 87]: toponyms belonging to the language of the indigenous population, the meaning of this type of toponyms is usually clear; names originating from the language of this population, but somewhat modified; names that came from the language of other peoples, but changed according to modern language rules; toponyms borrowed from foreign languages; names belonging to two or more languages, hybrid names.

Geographical names are etymologically divided into the following types: names that are clear in their meaning (with a clear etymology); toponyms clear from etymological analysis; toponyms, the meaning of which is unknown (unclear), are called etymologically obscure.

The American toponymist J. Stuart proposed in the 70s of the XX century the following classification of geographical names: descriptive; associative; related to incidents; possessive; memorial; folk etymological; artificial; advisory; erroneous; transferred [1, p. 52].

The Belarusian scientist V. Basik [1] divided toponyms into the following classes according to the type of object they represent: oronyms, hydronyms, helionims, dronims, horonyms, agronyms, dromonims, urbanonyms, oikonyms. Each class is further divided into subclasses.

E. Murzaev [3, p. 93-98] recommended dividing geographical names into the following groups: names given according to some features of the relief; names given by some signs of water bodies; phytotoponyms, zootoponyms, anthropotoponyms, industrial toponyms, trade and transport toponyms, social names, ethnotoponyms, ideological names.

Kh.Khasanov divided geographical names according to their origin into 10 groups [6, p.26-33]: names associated with the location of the object, relief and climate; hydronyms; names associated with plants and animals; names associated with minerals; names associated with the craft of the people and administration; ethnonyms, names associated with names, surnames and nicknames of people, mythical and religious names, strange names, modern names.

S. Karaev [7] recommends dividing toponyms into the following types: ethnotoponyms, patronymics, phytotoponyms, zootoponyms, anthropotoponyms, toponyms reflecting geographical conditions, toponyms consisting of geographical terms, toponyms associated with the craft of the people, theological toponyms, translated toponyms, toponyms , reflecting the place of residence, toponyms associated with the pedigree.

A two-stage classification system for geographical names was proposed by P. Gulyamov. He divided toponyms into the following three large groups:

I. Geographical names associated with the natural features of the place.

II. Geographical names associated with socio-economic, political characteristics.

III. Mythical and strange names.

Each large group, in turn, is further subdivided into separate species.

1. Geographical names associated with the natural features of the place: names associated with the geographical location of the place; names associated with a particular feature of the place; toponyms associated with the terrain; names associated with climate, meteorological elements; names associated with water objects

- hydronyms; names relating to plants, their species; toponyms associated with animals; toponyms derived from minerals.

2. Geographical names associated with socio-economic, political characteristics: names associated with the craft of the population and administration; historical names associated with important events in the history of the country; ethnonyms; anthroponyms - toponyms associated with first names, surnames and nicknames of people; religious names; modern names.

III. Mythical and strange names: mythical names, strange names.

From a geographical point of view, the classifications proposed by E. Murzaev, Kh. Khasanov and P. Gulyamov are more perfect and convenient.

Based on the classification of H. Khasanov, we propose the following classification of geographical names:

1. Related to the state and specific characteristics of the place.
2.Related to the geographical location of the place.
3. Related to relief (geomorphonyms).
4.Climate and weather related.
5. Associated with water bodies (hydronyms).
6. Associated with plants (phytonyms).
7. Related to the animal world (zoonyms).
8. Associated with minerals and rocks.
9. Related to the craft of the people.
10. Associated with nationalities, clans and tribes (ethnonyms).
11. Associated with names, surnames and nicknames of people (anthroponyms).
12. Mythical names.
13. Religious names.
14. Strange names.
15.Modern names (neotoponyms).

It can be seen that among these groups, most geographical names reflect the specific features of a geographical object, its natural conditions, and components of nature. The study and research of such toponyms allows us to draw conclusions about what the nature of the territory of our country was like in the past, how the components of nature and the living conditions of the population changed, what the cultural landscape was like in a particular area.

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DOI 10.34660/INF.2023.83.31.002

婴幼儿急性肾功能衰竭的昼夜呼吸节律
CIRCADIAN RESPIRATORY RHYTHM IN ACUTE RENAL FAILURE IN INFANTS

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抽象的。对37例10月龄至3岁4月龄因无尿1～5天入院的急性肾功能衰竭（ARF）患儿每小时呼吸频率（RR）监测资料进行研究。 第一天，所有入院的儿童都表现出适度的呼吸增加。 在第 1 组中，第 5 天和第 6 天，呼吸频率的昼夜节律中值显着降低 10%，第 10 天降低 19%。 在第 2 组中，稍后注意到呼吸困难有所减轻——在第 7 天减少了 21%，在第 25-30 天平均减少了 27%。 第3组，前6天，呼吸频率的昼夜节律与第1天无差异。第7天，第3组几乎所有患者均根据适应症转入机械通气。 在保留自主呼吸的患者中，第 1 组呼吸频率的变化与 SBP、HR 和 MVP 呈正相关。 获得的结果对应于 RR 变化的代偿意义与 SBP、HR 的增加平行，心肌需氧量相应增加。 而在第二组中，仅发现呼吸频率随着 TPR 增加而增加的趋势，来自 IOC 的反馈、心输出量、由于 IOC 和 SV 降低导致呼吸增加的趋势，最有可能的特征是 心力衰竭引起的代偿性呼吸增加。 在第 3 组中发现的 RR 和 DBP 之间的负相关表明对外周血管张力降低的代偿反应，这通常是导致前负荷降低的低血容量状态的特征。 除了呼吸频率与每搏输出量、心输出量、收缩压之间的动态负相关外，还证明了呼吸系统对进行性心力衰竭的代偿反应。

关键词：昼夜呼吸节律，急性肾功能衰竭，婴儿。

Abstract. *The data of hourly monitoring of respiratory rate (RR) in 37 children with acute renal failure (ARF) admitted with anuria from 1 to 5 days at the age of 10 months to 3 years 4 months were studied. On the first day, all admitted children showed a moderate increase in breathing. In group 1, on days 5 and 6, a significantly significant decrease in the mesor of the circadian rhythm of the respiratory rate by 10% and by 19% on the 10th day was revealed. In group 2, a decrease in dyspnea was noted a little later - on the 7th day by 21%, on the 25-30th day by an average of 27%. In group 3, during the first 6 days, the mesor of the circadian rhythm of the respiratory rate did not differ from that on day 1. On the 7th day, almost all patients of group 3 were transferred to mechanical ventilation according to indications. In patients with preserved spontaneous respiration,*

positive correlations of changes in respiratory rate in group 1 with SBP, HR, and MVP were revealed. The results obtained correspond to the compensatory significance of changes in RR in parallel with an increase in SBP, HR with a corresponding increase in myocardial oxygen demand. While in the 2nd group, only a tendency to an increase in respiratory rate with an increase in TPR was found, feedback from the IOC, cardiac output, a tendency to increase respiration due to a decrease in the IOC and SV, most likely characterized a compensatory increase in respiration due to heart failure. The negative correlation between RR and DBP found in group 3 indicated a compensatory response to a decrease in peripheral vascular tone, which is usually characteristic of a hypovolemic state that causes a decrease in preload. As well as a negative correlation between the dynamics of respiratory rate with stroke volume, cardiac output, systolic blood pressure, testified to a compensatory reaction of the respiratory system to progressive heart failure.

Keywords: *circadian respiratory rhythm, acute renal failure, infants.*

Relevance. Shortness of breath (dyspnea) - rapid or difficult breathing with the involvement of accessory muscles in the act of breathing. Occurs with hypoxemia, hypercapnia, excess in the blood serum and in the brain tissues of underoxidized products. Dyspnea is a discrepancy between little physical exertion and a significant increase in ventilation, or the inability to provide this increase in ventilation. Shortness of breath in acidosis is caused by irritation of the respiratory center during acidification of the blood and proceeds with alveolar hyperventilation. Therefore, in clinical practice, deep, often accelerated breathing is a clear sign of acidosis. The most common causes are diabetic coma and renal failure. Serious consequences of oliguria/anuria in acute renal failure (ARF) are pulmonary and cerebral edema, hypervolemia (volume overload), hyperkalemia, acidosis, drug toxicity. The goal of intensive therapy for acute renal failure is the prevention of these potentially fatal complications and renal ischemia: optimization of hemodynamics, active treatment of hypoxia, provision of zero or even negative balance for the prevention of pulmonary edema in anuria, monitoring of blood electrolyte composition, acid-base balance (ABB). However, there is not enough information in the literature on monitoring the state of external respiration in the anuric phase in children under 3 years of age with acute renal failure, which served as the basis for this study [1-5].

Goal of the work. To study the features of the circadian rhythm of respiratory rate in children with acute renal failure in the period of anuria at an early age.

Material and research methods. The data of hourly monitoring of respiratory rate (RR) in 37 children with acute renal failure admitted to the ICU of RSCEMC with anuria from 1 to 5 days at the age of 10 months to 3 years 4 months were

studied. Prior to admission to the clinic, all patients received anti-inflammatory therapy aimed at the treatment of ARI-2, pneumonia 25, glomerulonephritis - 8, AII-3 patients. According to the indications, due to severe progressive respiratory failure, patients were provided with invasive mechanical respiratory support from the first day. All patients underwent hemodialysis, 4 patients underwent hemodialysis in combination with plasmapheresis under the control of hemodynamics, acid-base status (ABS), respiratory system, supportive, antibacterial, anti-inflammatory, syndromic corrective intensive therapy according to the recommendations in the literature. A favorable outcome with the restoration of full functional activity of the kidneys and discharge from the hospital was observed in 27 children (groups 1 and 2), an unfavorable outcome in 10 children (group 3). The first group consisted of patients who received intensive care in the ICU for up to 10 days (12), the second - children (15) with a favorable outcome after intensive care for 11-65 days.

Results and its discussion. As shown in Table 1, the duration of intensive care in children of groups 2 and 3 significantly exceeded the duration of treatment in the ICU in group 1 by 20 or more days ($p<0.05$, respectively). In group 2, the duration of mechanical respiratory support (MRS) was 18.6 ± 8 days, in group 3, a longer MRS, unfortunately, did not improve the outcome of the disease.

Table 1.

Characteristics of patients

Groups	Age, month.	Start of IVL, days	Duration of MCI, days	In ICU, days
1	29±2,8	0	0	7,8±1,5
2	19±7,7	4,3±3,5	18,6±7,6	27,8±4,3*
3	30,5±6,5	5,5±0,5	25,5±6,7	30,7±6,8*

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

On the first day, all admitted children showed a moderate increase in breathing, as evidenced by the mesor of the circadian rhythm of the respiratory rate in group 1 - 34 ± 2.4 per minute, in group 2 - 33.8 ± 5.3 per minute, in group 3 - 31, 8±1.4 per minute (Table 2). As can be seen from the data presented in Fig. 1, not a single child of group 1 received MCI during intensive care in the ICU due to the lack of indications. In group 2, already at admission to the clinic, 1 child was transferred to mechanical ventilation in the CMV mode and 1 - SIMV, on the 2nd day MCI was carried out in group 2 6, on day 3 - 7, on 5e - 8, and on the 8th day the need for MCI was observed in 6, then on days 9-17 respiratory support was provided to 8-9 patients. Only from the 18th day there was a tendency to reduce the need for mechanical ventilation due to the gradual restoration of adequate breathing followed by extubation in children of the 2nd group on the 30th day. In group 3,

MCI was started on the second day in 3 patients (out of 10) with a gradual increase in the number of patients up to 8 who needed hardware respiratory support due to the progression of acute respiratory failure. In two children of the 3rd group, sudden cardiac arrest occurred against the background of spontaneous breathing; resuscitation measures were carried out without effect.

Table 2.

Dynamics of the Mesor of the Circadian Rhythm of the Respiratory Rate

Days	1 group	2 group	3 group
1	34,0±2,4	33,8±5,3	31,8±1,4
2	30,1±0,6	33,3±0,7‴	33,9±0,4‴
3	32,1±0,6	28,8±1,7‴	33,2±1,4
4	33,6±0,6	29,9±0,6‴	31,4±0,9
5	30,5±0,8*	27,1±1,0‴	31,4±1,5
6	30,1±0,7*	26,9±0,5‴	27,9±2,9
7	32,1±0,9	26,6±0,5* ‴	
8	30,8±2,4	28,5±0,6	
9	29,6±1,8	27,0±1,5	
10	27,4±0,6*	30,1±0,7‴	
11		30,3±1,7	
12		30,3±0,5	
13		27,9±1,0	
14		30,3±0,5	
15		26,1±1,2	
16		27,3±0,9	
17		28,8±1,5	
18		32,5±1,7	
19		30,6±0,5	
20		31,4±1,3	
21		34,9±1,1	
22		34,7±0,6	
23		36,7±0,7	
24		25,5±3,6	
25		24,5±1,1*	
26		24,6±0,7*	
27		25,0±0,8*	
28		25,4±0,8*	
29		24,9±0,8*	
30		22,5±0,7*	

Table 3.

Average respiratory rate in circadian rhythm

Hours	1 group	2 group	3 group
8	31,8±1,7	28,8±3,1	32,8±0,8
9	31,3±1,8	28,8±3,2	33,0±1,2
10	30,8±2,4	28,9±3,0	33,8±0,6
11	30,4±2,0	28,7±2,8	33,2±0,8
12	30,3±2,0	28,8±2,9	32,3±2,3
13	31,0±1,1	28,9±2,9	31,6±2,0
14	31,4±1,3	29,1±3,1	32,2±1,1
15	31,1±1,3	29,2±3,1	32,0±1,4
16	31,2±1,2	29,6±3,1	31,7±1,7
17	31,5±1,3	29,1±3,4	31,5±1,7
18	31,6±1,4	29,0±3,2	31,4±1,8
19	31,2±1,5	29,4±3,4	31,1±2,3
20	31,4±1,9	29,3±3,2	31,0±2,6
21	30,7±2,0	29,3±3,2	30,6±2,2
22	31,4±2,3	29,0±3,0	30,8±2,7
23	30,9±2,6	28,8±3,2	32,0±2,7
24	30,7±2,3	28,7±3,3	31,0±1,9
1	30,6±2,4	28,7±3,2	31,2±2,3
2	30,3±2,2	28,2±3,2	30,8±2,5
3	31,8±3,9	28,3±3,7	31,1±2,3
4	30,2±2,2	28,2±3,4	31,1±2,2
5	30,5±2,0	28,6±3,2	31,0±2,2
6	30,7±1,9	28,8±3,1	31,2±2,5
7	30,8±1,7	28,8±3,2	30,7±2,7

*-certainly relatively Indicator in 1 day

‴-significantly relative to the indicator in group 1

In dynamics, we studied changes in the frequency of spontaneous breathing in patients during the period of anuria until the recovery of the excretory function of the kidneys. At the same time, in group 1, on days 5 and 6, a significantly significant decrease in the mesor of the circadian rhythm of the respiratory rate by 10% and by 19% on the 10th day was revealed. In group 2, shortness of breath decreased somewhat later - on day 7 by 21% ($p<0.05$), on days 25-30 by an average of 27% ($p<0.05$). In group 3, during the first 6 days, the mesor of the circadian rhythm of the respiratory rate did not differ from that on day 1. On the 7th day, almost all patients of group 3 were transferred to mechanical ventilation according to indications. A comparative assessment revealed that on days 2-7 the level of the

mesor of the circadian rhythm of the respiratory rate in group 2 was significantly different from that in group 1. So, on day 2 in groups 2 and 3, a more pronounced tachypnea (by 10%) was noted, and on days 3-7 in patients of group 2, a decrease in respiratory rate by an average of 10% was detected (Table 2). That is, the positive dynamics of the state of patients in the 2nd group was expressed in a decrease in the mesor of the circadian rhythm of the respiratory rate already on the 3rd day, and persistent positive dynamics was noted only on the 25-30th day of treatment. While in the 3rd group, the increase in signs of ARF detected on the 2nd day only progressed in the following days (Fig. 2).

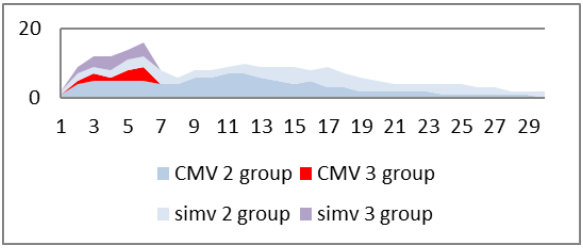

Figure 1. *Mechanical respiratory support for acute renal failure in children under 3 years of age*

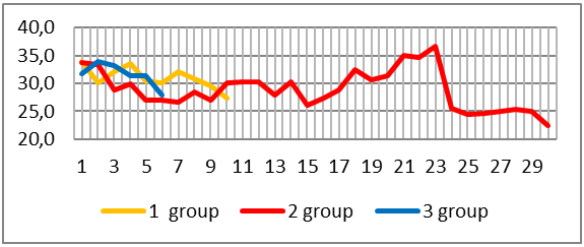

Figure 2. *Dynamics of the mesor of respiratory rate per minute with acute renal failure up to 3 years*

As can be seen from the data presented in Table 3, there were no significant differences in the average over the period of observation of the circadian rhythm of the respiratory rate between the groups, as well as in changes during the daytime and at night. A somewhat less pronounced increase in respiration was noted in group 2 relative to groups 1 and 3 (Fig. 3). The absence of significant deviations in the circadian rhythm, apparently, is due to a decrease in the participation of the respiratory system in the compensatory mechanisms described in the literature, partly due to drug sedative therapy and, to a greater extent, the rapid exhaustion of the center of respiration regulation and the respiratory muscles with a combination of oxygen deficiency due to ARF (ARI, pneumonia), severe metabolic shift in the

acid-base balance, intoxication in conditions of accumulation of excess water and electrolyte shifts in the water spaces of the body of children under three years of age with an age-related tendency to cellular overhydration.

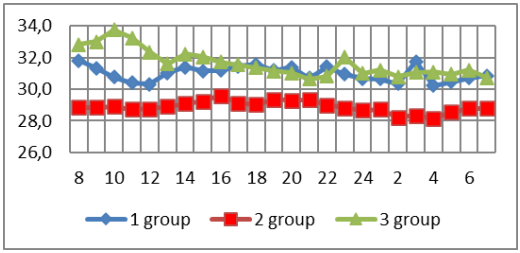

Figure 3. *Respiratory rate per minute in circadian rhythm*

The most pronounced daily fluctuations in respiratory rate were noted on day 1 in children of group 2, the amplitude of the circadian rhythm was 9 breaths per minute and in group 1 - 15 breaths per minute (Fig. 4).

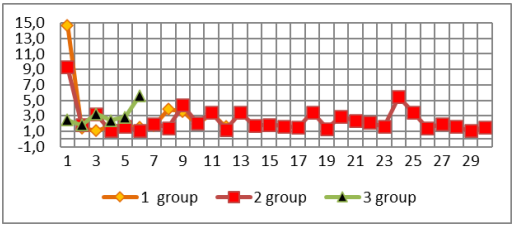

Figure 4. *Dynamics of the amplitude of the circadian rhythm of the respiratory rate per minute*

It is noteworthy that in group 2 the amplitude of the circadian rhythm of the respiratory rate was only 1-5 breaths per minute (Fig. 4), which can be explained by the insignificant adaptive capabilities of infants, sedative correction of the manifestations of acute cerebral insufficiency caused by the underlying disease.

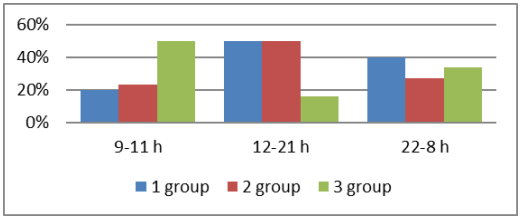

Figure 5. *The duration of the inversion of the circadian rhythm of RR per minute.*

Inversion of the circadian rhythm of the respiratory rate was observed in group 1 for 4 days (out of 10), in group 2 - 8 days (out of 30), 2 days (out of 6) in group 3 (Fig. 5).

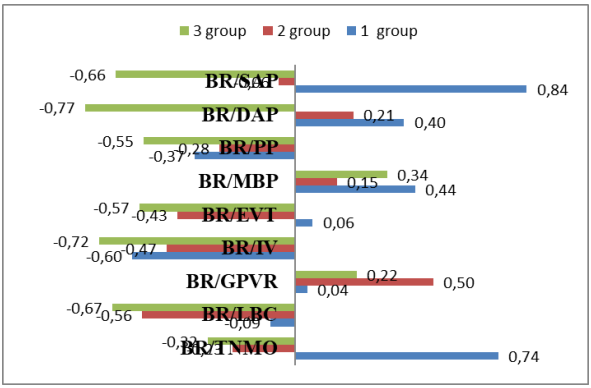

Figure 6. *Correlations RR per minute.*

In patients with preserved spontaneous breathing, positive correlations of changes in respiratory rate in group 1 with SBP (0.84), with MVP (0.74) were revealed. The results obtained correspond to the compensatory significance of changes in RR in parallel with an increase in SBP with a corresponding increase in myocardial oxygen demand. While in the 2nd group, only a tendency to an increase in RR with an increase in TPR was found, feedback from the IOC (-0.56), SV (-0.47), a tendency to increase breathing due to a decrease in the SV and SV, most likely , characterized compensatory increased respiration due to heart failure. The negative correlation between RR and DBP (-0.77) found in group 3 indicated a compensatory response to a decrease in peripheral vascular tone, which is usually characteristic of a hypovolemic state with a decrease in preload. As well as a negative correlation between the dynamics of respiratory rate with stroke volume (-0.72), respiratory rate and cardiac output (-0.67), respiratory rate and SBP (-0.66), testified to a compensatory response of the respiratory system to progressive heart failure (Fig. 6).

Conclusion. On the first day, all admitted children showed a moderate increase in breathing. In group 1, on days 5 and 6, a significantly significant decrease in the mesor index of the circadian rhythm of the respiratory rate was revealed. In group 2, a decrease in dyspnea was noted a little later - on the 7th day, on the 25-30th day. In group 3, during the first 6 days, the mesor of the circadian rhythm of the respiratory rate did not differ from that on day 1. On the 7th day, almost all patients of group 3 were transferred to mechanical ventilation according to indi-

cations. In patients with preserved spontaneous breathing, positive correlations of changes in respiratory rate in group 1 with SBP, with MVP were revealed. While in group 2, only a tendency to an increase in respiratory rate with an increase in TPR, feedback from the IOC, cardiac output, a tendency to increase respiration due to a decrease in the IOC and cardiac output were found, which most likely characterized compensatory increased respiration in heart failure. The negative correlation between RR and DBP found in group 3 indicated a compensatory response to a decrease in peripheral vascular tone, which is usually characteristic of a hypovolemic state that causes a decrease in preload. As well as a negative correlation between the dynamics of respiratory rate with stroke volume, cardiac output, systolic blood pressure, testified to a compensatory reaction of the respiratory system to progressive heart failure.

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DOI 10.34660/INF.2023.26.53.003

为多根牙齿选择根销接头模型的科学依据
SCIENTIFIC JUSTIFICATION OF THE CHOICE OF A ROOT PIN TAB MODEL FOR MULTI-ROOT TEETH

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抽象的。 在研究中，对不同设计的钴铬合金和二氧化锆制成的根钉片修复的不同根部结构的多根牙的组织应力-应变状态变化的结果进行了数学计算。 将基于 3-D 模型的数学计算与实验室研究的结果进行了比较，该实验研究了根销片修复的咀嚼牙齿的强度特性。 结果分析表明，不同牙根结构的牙齿存在应力分布特征。 对于牙根相对平行的咀嚼牙齿，最好在根管内模拟数个销钉，前提是舌片销钉部分的长度至少为牙根长度的 3/5-2/3。 对于弯曲牙根的牙齿，当无法模拟多个长销钉时，应优先选择带有一个销钉和卸载平台的标签

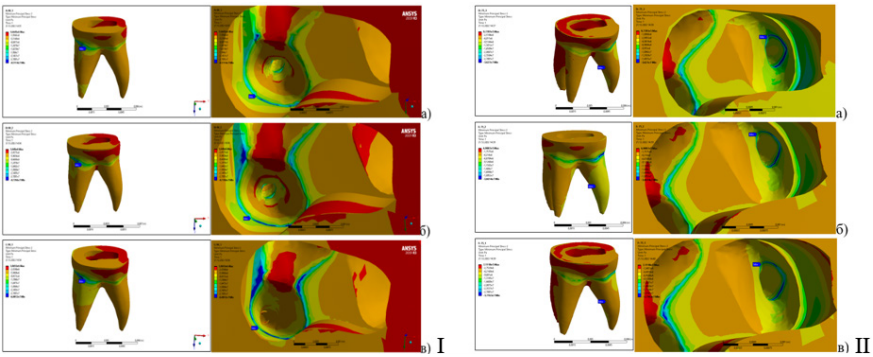
关键词：根管钉，牙齿修复。

Abstract. *In the study, the results of mathematical calculations of changes in the stress-strain state of the tissues of multi-root teeth with different structure of the roots restored by root pin tabs of various designs made of cobaltchromium alloy and zirconium dioxide were carried out. Mathematical calculations based on 3-D models were compared with the results of an experimental study in the laboratory of the strength properties of chewing teeth restored by root pin tabs. The analysis of the results showed the presence of stress distribution features for teeth with different root structures. For chewing teeth with relatively parallel roots, it is preferable to model several pins into the root canals, provided that the length of the pin part of the tab is at least 3/5-2/3 of the root length. For teeth with curved roots, when it is impossible to model several long pins, preference should be given to tabs with one pin and an unloading platform*

Keywords: *root pin tabs, prosthetics of teeth.*

Restoration of tooth tissues with root pin inlays (RPI) is an urgent task, since it allows preserving the natural periodontium of the teeth and its functions, unlike an implant, which can be installed in the event of the removal of destroyed roots. An analysis of the literature shows the presence of conflicting data regarding recommendations on the optimal number of pins and sizes of root inlays for multi-rooted teeth. Some authors argue that the presence of several pins at the RPI leads to an excess of the limiting stress values in the root furcation zone [1]. Studies by other authors prove that the number of pins does not play any significant role for the service life of the structure [2,3]. There is an opinion that in order to increase the retention of the RPI and a more adequate distribution of pressure, pins should be modeled in all canals of multi-rooted teeth, even if they are insignificant in length [4.5]. The lack of a unified approach to the choice of RPI leads to negative consequences and errors in the work of orthopedic dentists [6]. An analysis of judicial practice shows that RPI are in third place among all non-removable orthopedic structures, the poor quality of which has become the basis for litigation [7,8].

The aim of the study was to conduct a mathematical analysis of the distribution of the main stresses in multi-rooted teeth, depending on the shape of the root structure, the number of pins and the material of the RPI. For study using Ansys SpaceClaim and Ansys Workbench software, 84 3-D models of the main types of posterior teeth were created with parallel roots (U-shaped roots), with roots curved more than 35° (L-shaped roots), with O-shaped roots and teeth with roots with a high degree of divergence (more than 35°) - Λ-shaped roots. For each type of teeth, RPI models were made with one, two and three pins of cobalt-chromium alloy (CCA) and with one and two pins for inlays of zirconium dioxide. As part of the tasks set, the main stresses were calculated taking into account the application of a load of 100N along the axis of the tooth (0°), as well as at an angle of 15°, 30° and 45° (Figure 1).



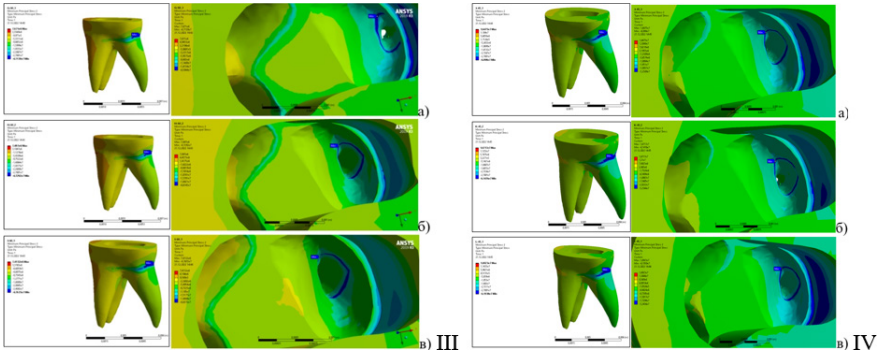


Figure 1. *The third main stresses in a tooth with A-shaped roots when modeling at the tab 1 pin (a), two pins (б) and three pins (в) under the action of a load of 100N at an angle of 0°Bateman G., Ricketts D.N., Saunders W.P. Fibre-based-postsystems: areview. Br. Dent. J. 2003;Vol. 19(1):43-48.*

Laboratory studies of the strength characteristics of teeth restored RPI from CCA were carried out on a Zwick Roell Z 010 testing machine with a traverse speed of 1 mm/min using the method we developed (patent No. 20022135389) (Figure 2). The results of laboratory tests were compared with the data of mathematical analysis.

Figure 2. *A model for testing the strength properties of teeth on a machine Zwick Roell Z 010*

As a result of the research, it was determined that the maximum stresses were concentrated on the outer side of the tooth in the zone of contact with the cortical layer of the bone, on the inner surface of the tooth - in the zone of root furcation and the end of pins.

When measuring stresses in the cases of modeling RPI with one, two and three pins, a similar pattern was observed, characterizing an increase in stress with a

decrease in the number of pins. The percentage of stress increase was not the same for teeth with different root shapes and CCA and zirconia inlays. In the absence of pins, the main load increased in the area of the bottom of the tooth cavity and the neck of the tooth.

In cases where long pins were modeled at the RPI, the stresses were distributed over a larger area. In addition, the spatial arrangement of the pins contributed to an increase in the flexural rigidity of the entire structure of the inlay with pins, which was an additional factor that reduces stress, especially in the case of an angled load that leads to tooth bending.

When using the RPI from zirconium dioxide, in the same type of cases, lower stress values were recorded than when using the RPI from CCA.

Tests of the strength properties of teeth in the laboratory confirmed the basic calculations on mathematical models and showed a clear dependence of the nature of damage to the hard tissues of the teeth on the form of the structure of the roots. In teeth with parallel roots and L-shaped roots, damage was mainly observed in the form of longitudinal cracks; for teeth with O-shaped and L-shaped roots, damage was recorded at lower loads and in the form of chipping of the walls of crowns and roots up to the root furcation zone.

Based on the data obtained in the course of the work, it should be recommended when planning orthopedic treatment and choosing the type of RPI to take into account the shape of the structure of multi-rooted teeth and the possibility of endodontic preparation and opening of the canals of the teeth under the RPI. If the clinical situation and the state of the root of the chewing tooth allows for the opening of several canals by at least 3/5-2/3 of the length of the roots, in practice, preference should be given to modeling RPI with several long pins. In situations where the root canals are strongly curved, obliterated, i.e. when it is not possible to open these channels for long pins, in order to eliminate the limiting stresses in the tissues in the area of the root furcation, it is necessary to model the RPI with one long pin and additionally form an unloading platform in the area of the bottom of the tooth cavity, perpendicular to the axis of the tooth.

The long-term results of using this approach in clinical practice showed that the percentage of favorable outcomes of treatment with the use of RPI in the form of the absence of inflammatory and destructive manifestations according to CBCT studies 1 year after treatment increased from 67% to 94%.

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DOI 10.34660/INF.2023.12.65.004

Calot 三角形结构的可变性
VARIABILITY OF THE ARCHITECTONICS OF THE CALOT TRIANGLE

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注解。 对文献数据分析了 Calot 三角结构的解剖学变异性。 将获得的信息进行结构化，并与我们自己对 100 例腹腔镜手术结论的数据分析结果进行比较。

关键词：Calot 三角，肝胆区，胆囊动脉。

Annotation. *The literature data were analyzed for the anatomical variability of the structures of the Calot's triangle. The obtained information was structured and compared with our own results of data analysis of 100 conclusions of laparoscopic operations.*

Keywords: *Calot's triangle, hepatobiliary zone, cystic artery.*

Currently laparoscopiccholecystectomyis one of the most popular treatments for cholelithiasis. One of the limiting factors is the difficulty of differentiating and isolating important anatomical structures in conditions of limited visibility when performing an operation through a laparoscopic approach. According to foreign authors in Europe and the USA, iatrogenic damage to the extrahepatic bile ducts inlaparoscopic cholecystectomyobserved in 0%-2.7% of cases, and according to Russian surgeons, this complication occurs from 0.18% to 1.75% of cases.[1]

In practice, when performing a laparoscopic cholecystectomy, the surgeon reveals the cystic duct through a small window, in the region of the Calot triangle. It is difficult to see the whole variety of anatomical variants of the passage of the extrahepatic bile ducts and branches of the hepatic artery through such a small access. The surgeon sees only a part of the anatomical diversity of the arrangement

of structures, which is located in the depths of the tissues and can be encountered during the operation. Dissecting tissues in a narrow window, he is forced to focus on those anatomical structures that he sees. And, only experience and knowledge of the variability of anatomical structures help in such a situation to avoid iatrogenic complications. [3]

Any deviations from the anatomical "norm" usually originate in violations of the development of primary germinal rudiments. The gallbladder and liver appear as a ventral "hepatic" diverticulum from the caudal end of the foregut. This diverticulum is divided into two parts: a large cranial, which is the rudiment of the liver. The caudal kidney forms the gallbladder. [2] Rotation of the duodenum lines up the common bile duct dorsally between the pancreas and the duodenum. Variants of the anatomical structure of the extrahepatic bile ducts and the location of the gallbladder begin with developmental abnormalities at the fourth week of gestation. Variant development can occur in the gallbladder, bile ducts, and related arterial structures. [1]

During the formation of a human fetus, a number of changes in the vascular bed of the liver occur, which leads to numerous variations in the architectonics of extrahepatic structures. Anomalies of the anatomy of these structures, according to the literature, occur in up to 20% of cases [3]. However, the study of variant anatomy remains extremely relevant, as more and more of their forms are being discovered.

Variants of the structure of the cystic artery are also very diverse both in terms of source of origin, and in place and form of location in relation to the Kahlo triangle. Knowledge of this anatomy is directly related to the safety of surgical intervention, so, in 70-75% of cases, the cystic artery departs from the right hepatic artery. With this option, there is a risk of damage to the right hepatic artery due to the fact that it can be mistaken for the cystic artery. [2,4].

Non-standard anatomical structure of the extrahepatic bile ducts occurs in 20-30% of cases [3]. Although numerous studies based on surgical findings, endoscopic and radiographic data, autopsy results describe the frequency of anatomical variants of the biliary system, reaching 47% [1]. It has been established that anatomical variations of the biliary tree lead to different variants of the development of the corresponding arterial structures. Therefore, the anatomy of the arteries supplying the biliary system is much more diverse than the anatomy of the ductal system itself, and variants of its development are more common.

Aim: to analyze the architectonics of the Kahlo triangle according to the data of laparoscopic studies.

Materials and methods. A retrospective analysis of 100 postoperative reports of cholecystectomy was carried out to identify the features of the anatomy of the triangle of Calot. The analysis of domestic and foreign scientific publications in

the period from 2005 to 2023 was carried out using the databases: eLibrary, CyberLeninka, Russian State Library, PubMed, devoted to the study of variants of the structure of the Calot triangle. Statistical processing of the obtained results was carried out in the Excel program.

Results.

The analysis of literature data showed that in 60% of cases the anatomy of the Calot triangle corresponded to classical concepts. In 40%, atypical variants of anatomy were observed. All cases can be divided into variants of the anatomy of the bile ducts and variants of the anatomy of the arterial branches.

1. Variants of atypical anatomy of the bile ducts were observed in 20% of cases of cholecystectomy:

- long cystic duct. In a number of cases, he walked along the common hepatic duct and was associated with it.

- short cystic duct

- Atypical anatomy of the cystic duct (the cystic duct drained into the right hepatic duct and the presence of two cystic ducts flowing into the common hepatic duct).

- Accessory hepatic ductsin the form of small diameter thin-walled tubular structures. All of them originated from the right lobe of the liver and flowed into the common bile duct above the place where the cystic duct entered into it.

2.Variants of the anatomy of the arterial branches. (blood supply to the liver and gallbladder)

- Trunktype of blood supply to the gallbladder. In this case, the cystic artery passed behind the cystic duct. More rarely, it was in front of the cystic duct or passed along the cystic duct directly adjacent to its anterior or posterior surface.

- Loose type in the form of multiple small arterial trunks coming from the right branch of the hepatic artery or other sources occurs in 7%. Often such vessels passed in the elongated mesentery of the bladder. A much more serious danger is the option when the right hepatic artery forms a bend near the neck of the bladder. Very often, the arch of the right hepatic artery is located on the side and behind the neck of the bladder, it is intimately soldered to its wall. In this case, it can be easily mistaken for the cystic artery and ligated, which can lead to serious consequences. Therefore, the isolation of one cystic artery should not reassure the surgeon; one should expect to encounter other branches hidden in the tissues. Bleeding from these branches is difficult to stop because of the risk of damage to the hepatic artery. Large arteries in the bladder bedoccur in 7% of cases. As a rule, they give branches to the back wall of the bubble.

In 70-75% of cases, the cystic artery departs from the right hepatic artery. According to other data of anatomical studies, the cystic artery in 48% of cases departs from the right hepatic artery, in 22% - from the left hepatic artery, in

13% of cases it originates from the additional right hepatic artery, in 9% - from the common hepatic artery, in 5 % - from the gastroduodenal artery, 2% - from the celiac trunk and 1% it can depart from the superior mesenteric artery. At the bladder neck, it is divided into superficial and deep branches. In addition, it gives a thin branch to the cystic duct, which runs along its posterior surface and often produces minor bleeding in the process of isolating the cystic duct. According to the literature, the cystic artery in the form of a separate trunk occurs in 21% - 88% of cases. Such a scatter of data is more likely due to the difference between surgical findings and anatomical data. About ¼ of the cases, the superficial and deep branches of the cystic artery have a separate source. The deep cystic artery usually arises from the right hepatic artery, while the superficial cystic branch may originate from the right hepatic, common hepatic, left hepatic, gastroduodenal, or retroduodenal arteries.

Large venous sinuses in the bladder beddifficult to visualize, the incidence is 2%. Usually, when the posterior part of the bladder is exposed, they look like large protruding bluish-colored trunks running along the bed with venous tributaries flowing into them. The thin wall of the sinus is easily damaged when the bladder is released, which is accompanied by rather massive bleeding, which in some cases can be difficult to stop.

Large vessels passing near the wall of the gallbladder. Arterial trunks, of a rather large diameter, pass along the anterior-lateral wall of the bladder from the right hepatic artery and go into the liver parenchyma, giving several small branches to the wall of the bladder.

Features of the anatomy of the cystic artery according to the analysis of data from 100 laparoscopies: the classic variant occurred in 81% of cases. Atypical architectonics of the cystic artery occurred in 14% of cases (accessory cystic artery); in 5%, the cystic artery was not visualized in the region of the Calot triangle.

Conclusions. There is a pronounced variability in the architectonics of the triangle of Calot and the cystic artery in particular, especially in terms of its place of origin, number and length. Knowledge about the accessory cystic artery is of practical importance, since its damage can lead to significant bleeding, which, under conditions of laparoscopic access, can create significant complications. The frequency of non-standard anatomical structure of the extrahepatic bile ducts, according to most studies, occurs in 20-30% of cases. Anatomical variations of the biliary tree lead to different variants of the development of the corresponding arterial structures. Variants of the anatomy of the bile ducts were noted in 20% of cases.

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DOI 10.34660/INF.2023.46.30.005

脑膜瘤，以临床病例为例看问题

MENINGIOMA OF THE BRAIN, A LOOK AT THE PROBLEM ON THE EXAMPLE OF A CLINICAL CASE

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注解。 本文就多发性脑膜瘤的临床意义、诊断原则和治疗策略等问题进行探讨。 提出自己的临床观察。

关键词：多发性脑膜瘤，脑肿瘤，临床意义，诊断，治疗原则。

Annotation. *This article discusses the issues of clinical significance, principles of diagnosis and tactics of curation of patients with multiple meningiomas. Own clinical observation is presented.*

Keywords: *multiple meningiomas, brain tumors, clinical significance, diagnosis, principles of treatment.*

Tumors of the sheath-vascular series – Meningioma is a tumor originating from spider cells, which are one of the three meningial membranes of the central nervous system. It is an extraaxial tumor and fills the space of the cranial cavity or spinal canal, does not penetrate into the nervous tissue, but at the same time displaces and compresses it, which causes the so-called mass effect, and consequently neurological deficit.

Localization of these tumors is intracranial, ubiquitous. The most common are meningiomas arising from the membranes of the arch. They are easily removed because they barely come into contact with the cerebral cortex. The term “meningioma” was introduced in 1922 at the suggestion of H. Cushing to refer to extracerebral, expansively growing tumors of the dura mater.[1]

Meningioma in most cases originates from arachnoidendothelial cleavages (pachyonic granulations) vascular (arachnoid, arachnoid) membrane, tightly fused with the dura mater, less often – from the soft membrane of the brain and spinal cord, rarely – from the vascular plexuses of the cerebral ventricles or occurs ectopically in the bones of the skull, spine and along the course of nerve roots. [2] The function of pachyonic granulations is partial filtration of cerebrospinal fluid into the venous bed. The number of pachyonic granulations is small in children, but increases with age. The annual incidence is from less than 1 to 9.5 cases per 100 thousand people per year. The incidence of meningiomas increases with age and reaches about 8 cases per year per 100 thousand population aged 70-79 years. The peak incidence is from 40 to 60 years (58%). Most authors believe that meningiomas are significantly more common in women with a ratio of occurrence in men and women from 1:2 to 1:4 [3,4] According to American authors, no gender differences were found. [5]According to statistical studies based on our department, at present, it can be considered proven that there are no sex differences in the incidence of meningiomas at a young age and after 79 years. In children under the age of 16 (they make up no more than 1-2% of all meningiomas), malignant atypical and aggressive meningiomas are more common, which are often combined with neurofibromatosis. Depending on the cellular structure of the tumor, benign meningiomas (typical), conditionally benign (atypical), papillary and malignant (anaplastic) are isolated. Benign meningiomas have 11 histological variants. More than 90% of meningiomas are histologically benign. Nodes of multiple meningiomas in a patient may have both the same and different histological structure, which depends on the tissues surrounding the tumor. [6]

Among the factors that increase the likelihood of meningiomas, X-ray and radioactive radiation, head trauma, dietary nitrates, exposure to elevated magnetic fields, and the level of steroid hormones are reliably known. [7] Described variants of chromosomal abnormalities detected in men and women with meningioma. In most cases, meningiomas are sporadic (non-inherited) tumors, although there are isolated reports of familial forms. Within the framework of hereditary syndromes (genetic factor), such as neurofibromatosis type II (NF2), only 1-2% of all brain tumors develop. Risk factors for the development of multiple meningiomas are called X-ray irradiation of the scalp, as well as a hereditary genetic factor. Multiple intracranial meningiomas (primary multiple tumors) occur among all tumors of the meningovascular series in 0.9-18.9% of cases and are caused by a gene mutation, hereditary diseases or have a polygenic–multifactorial nature. They are characterized by a predominance by gender in women, able-bodied (fifth-sixth decade of life), and often young age of patients (patients with neurofibromatosis type II aged 20-40 years), difficulty in clarifying the diagnosis at early stages, as well as a high level of disability of patients. In childhood, multiple meningiomas

are extremely rare (casuistic observations are described). According to the mechanisms of occurrence, multicentricity, dissemination along the liquor pathways or implantation during surgery are distinguished. Currently, multiple meningiomas mean several (two or more), separately located tumors that do not have an obvious connection with each other. Numerous nearby tumors are attributed to meningomatosis only in patients with neurofibromatosis. Homolateral and heterolateral arrangement of nodes of multiple meningiomas is equally common. The features of the clinic of multiple meningiomas are the tendency to a progressive course, as well as the complexity of clinical syndromology, reflecting the multi-focal nature of the process. In the presence of several meningiomas, only one "leading" tumor is clinically manifested, and the rest remain asymptomatic. The clinical symptoms of multiple meningiomas, according to a number of authors, are characterized by three variants and are represented by either an asymptomatic course in the structure of neurofibromatosis type 2, or general cerebral symptoms, or focality. Also, from a clinical standpoint, it is possible to divide into primary multiple meningiomas characterized by moderate aggressiveness and benign course, and sequentially multiple, which may include anaplastic variants of tumors with aggressive growth. In the period from 2015 to 2022, about 50 patients with brain tumors of the meningeliomatous series, age distribution from 35 to 86 years, were examined on the basis of the Department of Neurosurgery of the State Medical Institution of the State Clinical Hospital of Pyatigorsk. The localization of the process is different, sizes from 0.6 mm to 90 mm. Of these, 32 patients underwent surgical treatment. The examination was carried out in full, mainly due to the forces of MRI with contrast enhancement, as well as EEG was performed to patients, due to the presence of signs of epilepsy of various types. Postoperative CT control was performed on the first day. The volume of removal and the presence of postoperative complications were evaluated.

We present a clinical observation in the dynamics of a patient with multiple meningiomas. Patient A., 55 years old with meningiomas in the left frontal, temporal, parietal region, right parietal region of the brain. The patient was admitted to the department in a subcompensated state. With complaints of headache, decreased strength in the right upper limb up to 2 points. Upon admission, a CT scan of the brain with contrast was performed, according to the results of which a diagnosis was made. After preliminary preparation (dehydration, decongestant therapy), an MRI of the brain with contrast was performed. Volumetric formations were revealed in the left frontal (20x30 mm), temporal (15x17mm), parietal region (20x25mm), right parietal region of the brain (14x16mm). CT angiography revealed an openness of the Vilisium circle in the form of aplasia of the posterior connective artery (ZSA). The patient was offered a two-stage surgical intervention, for which consent was obtained. The first stage was the decision to remove

the most clinically significant foci causing neurological deficits, namely foci in the left frontal, temporal, parietal regions. The postoperative period passed with the development of ischemic disorders in the areas of the cerebral cortex adjacent to the tumors, due to the fact that the tumors themselves were vascular collectors, and the vascular anomaly detected on CT-AG prevented the adequate implementation of contralateral blood supply. The patient was activated on the 10th day after the operation, and within 60 days after the surgical intervention, she fully regained the ability to self-serve and at the moment preparations are underway to remove the focus of the right parietal region, where due to the small volume and the so-called "mute zone", the development of neurological deficit is not expected. According to the description of the histological preparation, there is a macroscopic characteristic: A node with clear boundaries, gray-pink in color. Microscopically: cells without clear boundaries are detected, forming syncytial clusters. Cells with small nuclei of regular oval shape with dispersed field chromatin. Psammom bodies are present.

Conclusions. Based on the data provided above, at the present stage of neurosurgery, there are practically no CNS tumors that cannot be removed, only the question of the expediency of surgical intervention is being resolved, which must be weighed and justified. An important role is played by the possibilities of modern diagnostics, such as MRI, CT, performing tractography in order to determine the interest of the brain pathways, intraoperative neuromonitoring, navigation systems in order to minimize brain injury. And the most basic qualification of the surgeon performing the intervention. Also based on the results of histological examination, determining the direction of further treatment of the patient.

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DOI 10.34660/INF.2023.17.45.006

COVID-19 中靶器官的病理解剖
PATHOLOGICAL ANATOMY OF TARGET ORGANS IN COVID-19

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注解。 迄今为止，COVID-19 表现和并发症的病理解剖学、发病机制和形态发生仍未得到充分研究。 [1] 本文讨论了内分泌系统最脆弱的器官，例如：甲状腺、胰腺、肾上腺和周围免疫系统的器官：脾脏和淋巴结。 由于只有在进行病理解剖尸检时才有可能获得有关 COVID-19 任何器官结构变化的可靠信息，因此本研究从 22 名实验室确诊为新型冠状病毒感染 COVID- 19.

该论文介绍了从 2022 年 1 月 1 日到 2022 年 2 月 7 日在皮雅季戈尔斯克死亡的 22 例病理解剖尸检结果。 31-86岁（平均年龄58.5±21.4）来自重症 COVID-19，其中 9 名男性和 13 名女性。 根据世界卫生组织、俄罗斯卫生部和 Rospotrebnadzor 的监管文件，严格遵守生物安全规则，在改造后的病理解剖部门进行病理解剖。 由于最近出现了在快速发展的 COVID-19 感染背景下肺部其他内脏器官同时受损的病例，这促使我们寻找 SARS-CoV-2 病毒与这些器官之间的关系。 值得注意的是，我们已经发现临床病例，在上述传染病的背景下，出现了高血糖的最初迹象，这使患有各种形式糖尿病的患者面临并发症的风险。 服用糖皮质激素会增加肾上腺形态变化的风险。 此外，经实验室检测证实，感染新型冠状病毒的患者有亚急性甲状腺炎的临床症状。 免疫系统外周器官的变化备受关注，因为其病变有两个主要发展途径 [2]。 首先，淋巴系统是病毒进入人体最先遇到的。 其次，由于病毒感染的淋巴细胞传播类型，它在整个生物体的感染中起着重要作用 [3]。 支气管肺淋巴结群淋巴组织的肺外并发症也值得关注，因为它们靠近呼吸系统器官 [4,5]。 以上所有方面决定了所选主题的相关性。

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

Annotation. *To date, the pathological anatomy, pathogenesis and morphogenesis of COVID-19 manifestations and complications remain insufficiently studied. [1] This article discusses the most vulnerable organs of the endocrine system, such as: thyroid gland, pancreas, adrenal glands and organs of the peripheral immune system: spleen and lymph nodes. Due to the fact that obtaining reliable information about structural changes in any organ with COVID-19 is possible only when conducting pathoanatomical autopsies, autopsy material was collected in this study from 22 deceased patients with a laboratory-confirmed diagnosis of a New coronavirus infection COVID-19.*

The paper presents the results of 22 pathoanatomical autopsies that died in Pyatigorsk from 1.01.2022 to 7.02.2022. aged from 31 to 86 (average age 58.5±21.4) from the severe form of COVID-19, of which 9 are men and 13 are women. Pathoanatomic autopsies were performed in repurposed pathoanatomic departments in accordance with strict compliance with biosafety rules in accordance with the regulatory documents of the World Health Organization, the Ministry of Health of Russia and Rospotrebnadzor. Since recently there have been cases of simultaneous damage to other internal organs with the lungs against the background of a rapidly developing COVID-19 infection, this prompted us to look for a relationship between the SARS-CoV-2 virus and these organs. It is worth noting that we have found clinical cases where, against the background of the previously mentioned infectious disease, the first signs of hyperglycemia appear, which puts patients with various forms of diabetes at risk of complications. Taking glucocorticosteroids increases the risk of morphological changes in the adrenal glands. Also, patients who had a new coronavirus infection had clinical signs of subacute thyroiditis, confirmed by laboratory tests. Changes in the peripheral organs of the immune system are of high interest, due to the fact that its lesions have two main pathways of development [2]. Firstly, the lymphatic system is the first to encounter the virus when it enters the body. Secondly, it plays an important role in the infection of the entire organism as a whole due to the lymphocytic type of spread of viral infections [3]. Extrapulmonary complications in the lymphoid tissue of the bronchopulmonary group of lymph nodes also deserve attention, because they are in close proximity to the organs of the respiratory system [4,5]. All of the above aspects determine the relevance of the chosen topic.

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

The aim of the study was to conduct a study of autopsy material of patients who died from a new coronavirus infection. To determine the presence and nature of morphological changes in internal organs: pancreas, adrenal glands, thyroid gland, spleen, lymph nodes

Material and methods:

The material for the study was 44 samples of the adrenal glands, 22 samples of the pancreas and thyroid glands, 44 samples of the peribronchial lymph nodes, 22 samples of the spleen obtained from 22 patients with COVID-19. The SARS-COV-2 RNA virus was identified in all patients by PCR. The material was fixed in a 10% formalin solution for 24 hours, then subjected to standard histological wiring, followed by the production of sections, staining with hemotoxylin and eosin, microscopy. We analyzed the patient's medical record. The biochemical and clinical blood parameters, the dynamics of the patient's condition, the presence or absence of concomitant pathology, laboratory and instrumental research methods were taken into account.

Results. In all patients (100% of cases), the main cause of death of which was COVID-19, pronounced morphological changes in the lungs were detected, however, it is worth noting that simultaneous bilateral damage to the adrenal glands, pancreas and thyroid glands, spleen and lymph nodes was also determined. It is known that the lesion of the organs studied by us is multifactorial in nature and, according to Zairatiants and co-authors, has the name of clinical and morphological "masks" COVID-19 [1]. Among the factors contributing to the occurrence of morphological changes in the studied organs are: specific viral damage, hypoxia, hyperergic immune reaction, autoimmune genesis of the lesion is not excluded. COVID-19 is characterized by morphological changes associated with comorbid diseases and their complications in older age groups. Sepsis involving bacterial and mixed flora, occurring with multiple organ purulent foci, was diagnosed in a number of cases in deceased patients.

In our work, the peripheral organs of the immune system, represented by the spleen and lymph nodes, were considered. In the study, we identified a wide range of changes depending on such factors as: the duration of the disease, the presence or absence of comorbid diseases, features of therapeutic treatment. Similarly to the lungs, the phenomenon of autocytophagy in the marginal sinuses was detected in the lymph nodes of the bronchopulmonary group. Phagocytosis of whole lymphocytes was also present.

The macroscopic structure of the spleen in our study was characterized by: an increase in size, swelling, flabby consistency, abundant scraping of pulp on the incision. Microscopic examination revealed: preservation of zonality, clear definition of areas of white pulp, sclerosis and hyalinosis of blood vessels.

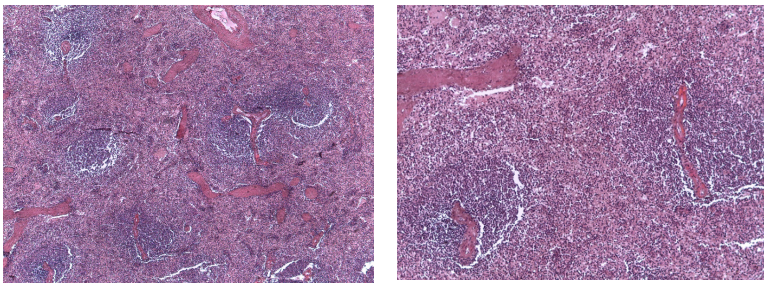

Figure 1. *The spleen in COVID-19.*
Zonality is preserved, areas of white pulp, sclerosis and hyalinosis of vessels are clearly defined. Ocd. Hematoxylin and eosin. Uv.x 40, 100

In turn, the lymph nodes showed the following structural features: Macroscopically, the peribronchial group of lymph nodes had a gray-pink color, and pronounced fullness was noted on the incision.

The erasure of the pattern, the absence of visualization of lymphoid follicles and light germinal centers were determined on histological preparations. Clusters of cells morphologically similar to monocytes were found in the sinuses. A rarity was the presence of small lymphoid follicles, light germinal centers in which were not visualized, in the sinuses and cortex – large clusters of large cells with the morphology of monocytes.

Microscopy in the peribronchial lymph nodes revealed the phenomenon of autocytophagy with pronounced fullness of the microcirculatory bed and erythrocyte sludge, and in 3 cases there was also an accumulation of lymphocytes and macrophages in the sinuses with the phenomenon of autocytophagy.

The macroscopic picture of the adrenal glands is as follows: topographically, the adrenal glands were located upwards and medially relative to the kidney. The right one had the shape of a pyramid, the left one was a crescent. Three zones were clearly defined on the section: the outer one was bright yellow, the middle one was a thin layer of brown, and the inner one was gray, represented by brain matter.

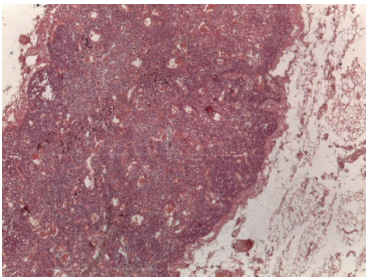

Figure 2. *Peribronchial lymph node in COVID 19. The erased pattern of the structure, lymphoid follicles and light germinal centers are not visualized by Ocd. Hematoxylin and eosin. Uv.x40*

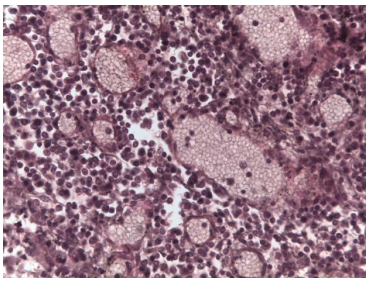

Figure 3. *Peribronchial lymph node Pronounced fullness of the microcirculatory bed and erythrocyte sludge. Ocd. Hematoxylin and eosin. Uv. 400*

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

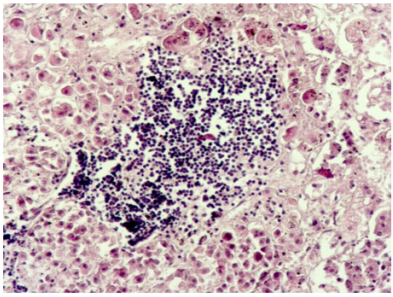

Figure 4. *The adrenal gland. Inflammatory infiltration in the adrenal cortex Ocd. Hematoxylin and Eosin Uv. x 200*

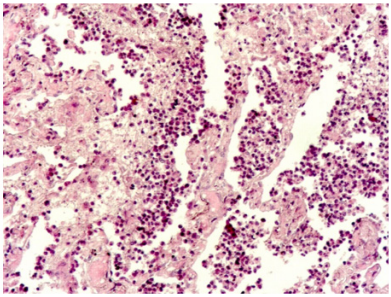

Figure 3. *The adrenal gland. Areas of necrosis in the adrenal cortex Ocd. Hematoxylin and Eosin Uv. x 200*

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

The microscopic picture of the pancreas is characterized by lipomatosis of the stroma and parenchyma, moderate atrophy of the exocrine parenchyma, fullness of the microcirculatory bed with erythrocyte sludge. Necrosis of cells of the endocrine part of the pancreas with perifocal fibrosis is quite rare.

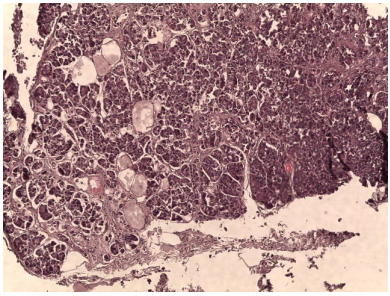

Fig. 6. *Pancreas. Focal lipomatosis. Ocd. Hematoxylin and Eosin Uv. x 100*

When considering the morphology of the thyroid gland , we noted the following changes:

Macroscopically: the thyroid gland is enlarged, of a dense consistency, the capsule is preserved.

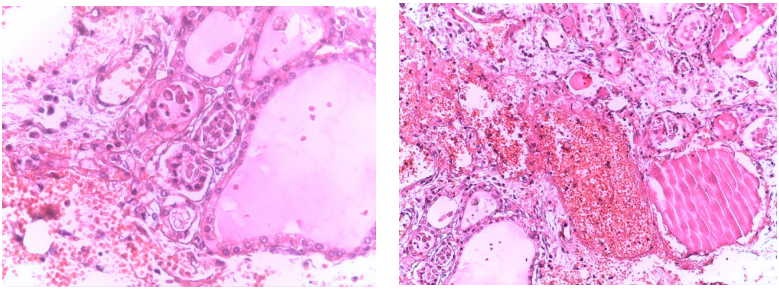

Figure 7. *Thyroid gland in COVID-19. Hemorrhage in the thyroid gland tissue. Ocd. Hematoxylin and eosin. Uv.x200, 400*

Microscopically: in two cases, subacute thyroiditis was detected with a pronounced predominance of lymphoid elements in the inflammatory infiltrate. And

also in patients infected with SARS-CoV-2 patients, severe damage to follicular cells was observed with destruction of the follicular epithelium, detachment of epithelial cells, fullness of capillaries and the development of fibrosis in the connective tissue between the follicles.

Conclusions: As a result of the study, pronounced morphological changes in the tissues of target organs were revealed in patients who died from laboratory-confirmed COVID-19 infection. The most frequent morphological manifestations in the lymph nodes were the lack of visualization of lymphoid follicles and light germinal centers, as well as the accumulation of cells with the morphology of monocytes, changes in the spleen were manifested in the form of loss of a clear border of the marginal and mantle zone, lack of visualization of lymphoid follicles, and germinal centers, it should also be noted the presence of stroma edema, fullness and hyalinosis of vessels in patients who died after a cytokine storm from infectious complications. In the adrenal glands, the cortical substance was mainly affected, with a histological picture of lymphocytic infiltration and necrosis sites. The characteristic changes in the morphological picture of the pancreas were lipomatosis, which was both focal and diffuse. Atrophy of the stroma, as well as the endocrine part of the gland. Changes in the thyroid gland were characterized by histological signs of subacute thyroiditis and hemorrhages in most cases. All of the above morphological changes confirm the hypothesis of synchronous with lung damage to internal organs associated with cytokine storm, as well as bacterial complications may be associated with transient immunodeficiency as a result of exposure to the SARS-COV-2 virus on the tissues of the lymphatic system.

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DOI 10.34660/INF.2023.30.86.007

上交叉综合征的体型表现
THE MANIFESTATION OF THE UPPER CROSS SYNDROME DEPENDING ON THE SOMATOTYPE

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抽象的。 目前，神经学家、治疗师和徒手治疗专家的日常活动的特点是需要确定颈椎肌肉骨骼系统功能性生物力学障碍的作用和意义，作为颈椎功能障碍发展的病因病理因素。 神经系统。 人体测量学研究，在此基础上可以将身体结构和功能的内部特征与人的外部参数联系起来，越来越多地被纳入医学的实践部分。 从健康人的人体测量中获得的结果可以用于临床医生研究发育障碍和形成“病态”的比较。 在我们的工作中，根据 M.V. 的方法研究了人体测量指标。Chernorutsky 并根据 Pinier 指数计算。

关键词：人体测量学，体型。 体型、功能性生物力学障碍、颈椎骨软骨病。

Abstract. *Currently, the daily activities of neurologists, therapists, and manual therapy specialists are characterized by the need to determine the role and significance of functional biomechanical disorders of the musculoskeletal system of the cervical spine as etiopathogenetic factors in the development of disorders of the functioning of the nervous system. Anthropometric studies, on the basis of which it is possible to connect the internal features of the structure and functions of the body with the external parameters of a person, are increasingly included in the practical part of medicine. The results obtained from the anthropometry of a healthy person can be used for comparison in the study of developmental disorders and the formation of “pathotypes” by clinicians. In our work, anthropometric indicators were studied according to the method of M.V. Chernorutsky and calculated according to the Pinier index.*

Keywords: *anthropometry, body type. somatotype, functional biomechanical disorders, cervical osteochondrosis.*

The relevance of studies of myoadaptive postural syndromes of osteochondrosis of the spine is due to the high prevalence and steady upward trend of these pathological conditions. Myoadaptive syndromes develop as a tonic reaction to an overload of individual muscle groups with an altered posture (postural myoadaptive syndromes) and in the presence of compression radicular pathology, when the remaining part of the muscles takes on the functions of weakened muscle groups. Data on the prevalence of osteochondrosis of the spine are very contradictory: for example, in the Russian Federation (RF), according to the materials of complex medical examinations, from 15 to 38% of the population suffer from this disease. [6]

An essential basis for the development of myoadaptive syndrome in the deformation redistribution of loads are neurodystrophic processes occurring in overloaded muscles.[2] Myoadaptive responses determine the localization of overloads in a specific muscle group and this determines the muscles with the greatest possibility of developing dystonic changes, which are replaced by dystrophic ones over time. At the same time, myoadaptive reactions can be considered as a kind of muscle imbalance - the non-compliance of the motor abilities of a particular muscle group with the age-related physiological norm and manifesting itself only in the form of visual asymmetry (individual originality) of the body position in space. Thus, myoadaptive syndromes arise as a pain reaction to an overload of some muscle groups with an altered postural function.[3]

Muscle-tonic disorders - myoadaptive tension of muscle groups in order to minimize pain, rarely acts in isolation. Muscular shortening and dystrophy affect the deformation not only of the spine, but also of the extremities. This is how secondary foci of irritation appear, which cause new reflex disorders in the process of adaptation to them - myoadaptive syndromes.

With hyperkyphosis of the thoracic spine, changes are more characteristic of the posterior muscle group of the shoulder girdle (subscapularis, rhomboid, middle portion of the trapezoid). With a “straight back”, changes in the anterior muscle group (large and small pectoral) are more often observed. With asymmetry in the location of the shoulder girdle in the frontal plane, the lesion on the side with the underlying scapula is the muscles that lift it, on the opposite side - the abductors.

The main manifestation of myoadaptive postural disorders is dystonia of the muscles of the body with the formation of a nonspecific pain syndrome. Upper cross syndrome is one of the most common examples of myoadaptive postural disorders. It has 3 causes:

1. imbalance of muscle activity between the upper and lower fixators of the shoulder girdle (the upper part of the trapezius muscle, the muscle that lifts the scapula, the scalene muscles, the lower part of the trapezius muscle, the latissimus dorsi muscle);

2. imbalance between the pectoral and interscapular muscles, deep flexors (long muscle of the neck, head, scapular-hyoid muscle) and extensors of the neck (cervical extensor of the back, upper part of the trapezius muscle);

3. imbalance between the flexors and extensors of the neck.

"Floor" syndrome occurs as a result of an imbalance of muscle activity along the length of the body. With this syndrome, areas of shortening and flaccidity of muscles change in the cranio-caudal direction.

Most common cause of imbalance is mechanical, as a result of long-term repetitive movements of the same type or stable postures. One of the factors in the formation of stable postures is the constant use of mobile devices, fixing the gaze on the screen of the device and tilting the neck.[4]

The constitutional approach makes it possible to more accurately determine the typological specifics of an individual's reactions to environmental adversity and reasonably identify risk groups in relation to damaging factors in order to timely implement preventive measures even before the onset of symptoms of the disease.[5] Somatotype determined on the basis of anthropometric measurements (somatotyping), genotypically determined, constitutional type, characterized by the level and characteristics of metabolism (the predominant development of muscle, fat or bone tissue), a tendency to certain diseases, as well as psychophysiological differences. It is assumed that the tendency to develop postural syndromes is associated with a person's somatotype. To date, the literature has not described the relationship between the appearance of the upper cross syndrome and constitutional features, which determines the relevance of this work.

Target. To study the postural imbalance of the cervical region, taking into account constitutional characteristics in adolescents.

Materials and methods.A prospective study was carried out: 100 young people (from 17 to 21 years old) were examined. The average age was 18 full years. Anthropometric indicators were studied according to the method of M.V. Chernorutsky and calculated according to the Pinier index. Measurements were made of such indicators as: weight (kg), height (cm), chest circumference on exhalation (cm). Postural characteristics of the cervical spine were assessed by determining the angle of inclination of the base of the neck, followed by evaluation of the indicators. Statistical accounting and analysis was carried out in the Excel program.

Results and discussions.

1) The distribution of constitutional types according to the results of the analysis of data from an anthropometric survey of 100 people (100%): asthenic body type - 31%; normosthenic - 40%; hypersthenic - 29%.

2) The distribution of indicators of the angle of inclination of the base of the neck, depending on the constitutional characteristics.

- Persons with an asthenic body type: the angle is less than 15-25 ° - 10%; normal tilt angle (15-25°) - 36% of cases; 25-35° - 29%; 35-45° - 12%; >40° - 13% of cases.
- Persons with a normosthenic body type were: the angle is less than 15-25 ° - 9% of cases; normal (15-25°) - 23%; 25-35° - 29%; 35-45° - 18%; >40° - 21%.
- Persons with hypersthenic body type: the angle is less than 15-25° - not seen 0%; normal (15-25°) - 10%; 25-35° - 71%; 35-45° - 5%; >40° - 14%.

3) The average angle of inclination of the base of the neck in adolescents with asthenic body type was 29°; with normosthenic body type - 37°; with hypersthenic - 32 °.

4) The results of the analysis of indicators of the angle of inclination of the base of the neck among 100 people: the norm (15-25°) - in 22%; 25-35 ° - in 36%; 35-40° - 10%; >40° - 32%.

Conclusion. According to the results of the examination to date, among 100 people, the average level of the inclination of the base of the neck was 34°, which is 9° higher than the norm, which means the presence of a pronounced postural imbalance in the cervical region with the formation of an upper decussation syndrome. The most pronounced postural imbalance was diagnosed among adolescents with a normosthenic body type.

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DOI 10.34660/INF.2023.72.91.008
UDC 612.084

修改用于评估物理性能的阶梯测试
MODIFICATION OF THE STEP-TEST FOR ASSESSING PHYSICAL PERFORMANCE

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抽象的。 为评估身体表现 (PP) 水平，WHO 建议使用 V.L. 修改的阶梯测试 PWC-170。 Karpman，它提供了各种高度和强度的攀登台阶，并允许您在各种条件下使用它。 在每次持续 5 分钟的两个负荷中完成第一个负荷后，坐在台阶上休息 3 分钟，期间休息 10 秒。 仅计算心率（HR，节拍/分钟），未对中枢血流动力学的功能状态进行其他研究。 在第二次负荷后，立即仅估计运动员的心率。

我们对台阶测试进行了修改，其中包括在两个相同的身体负荷后坐在台阶上休息时，运动员通过研究心率、收缩压（SBP、mm Hg）来控制中央血流动力学 和舒张压（DBP，mmHg）血压。

关键词：学生，身体表现，阶梯测试，显性 A.A. 乌赫托姆斯基。

Abstract. *To assess the level of physical performance (PP), WHO recommends using the step test PWC-170 modified by V.L. Karpman, which provides for climbing steps of various heights and intensity and allows you to use it in a variety of conditions. After performing the first of two loads lasting 5 minutes each, a 3-minute rest is provided while sitting on a step, during which for 10 seconds. only counting the heart rate (HR, beats / min) is carried out and no other studies of the functional state of central hemodynamics are carried out. Immediately after the second load, the athlete is estimated only heart rate.*

We have carried out a modification of the step test, which consists in the fact that after two identical physical loads while resting while sitting on a step, the

athlete controls the central hemodynamics with the study of heart rate, systolic (SBP, mm Hg) and diastolic (DBP, mmHg) blood pressure.

Keywords: *students, physical performance, step test, dominant A.A. Ukhtomsky.*

Introduction. Modern achievements in sports are unthinkable without careful medical control of the PP during the training and competitive process [3, 5, 6, 9, 10]. Without competent medical supervision of the training process, especially among young athletes, chronic fatigue and even "overwork" may develop, various pathological conditions associated with excessive unmetered physical activity may appear [2, 7]. In this regard, the possibility of not only promptly, but also objectively obtaining information about the level of the functional state and physical performance of athletes, and then, based on reliable data, predicting and correcting the training process is relevant. It is known that PP represents the potential ability of a person to show maximum physical effort in static, dynamic or mixed work [4]. Naturally, any of the tests used to assess PR has its advantages and disadvantages, which should be taken into account when examining athletes [1].

Purpose: to assess the functional state of the athlete's central hemodynamics both during a 3-minute rest after the first dosed load, and after the end of testing.

Material and methods. 36 young men aged 18.47±0.93 years old (main group - MG) were examined by random sampling, having a sports qualification of the first sports category (21), a candidate master of sports (9) and a master of sports of the Russian Federation (6), specializing in cross-country skiing , biathlon, martial arts and athletics (Fig. 1).

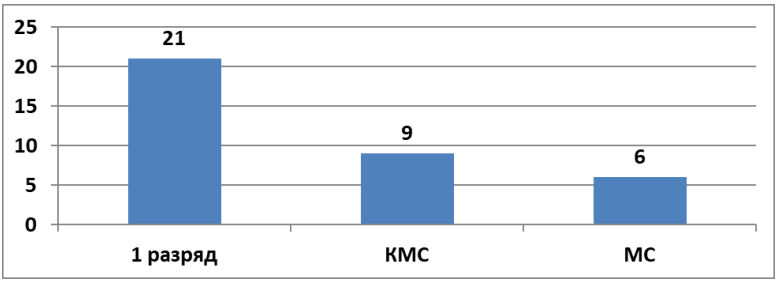

Figure 1. *The number of youth students with sports qualifications*

The control group (CG) consisted of 22 young men aged 18.62±0.86 who were not involved in sports. The evaluation of the PP was carried out according to the step test by V.L. Karpman. During the period of 3-minute rest after the first load and immediately after the second load, during the first and last 10 seconds of each minute, heart rate was calculated and blood pressure was measured according to

N.S. Korotkov. All young men never complained about their state of health and during an in-depth medical examination they belonged to the first group of health.

The studies complied with the ethical standards of biomedical ethics committees developed in accordance with the Declaration of Helsinki adopted by the WMA, as well as the Order of the Ministry of Health of the Russian Federation No. 226 of June 19, 2003 “Rules of Clinical Practice in the Russian Federation”. The principles of voluntariness, the rights and freedoms of the individual, guaranteed by Articles 21.2 and 22.1 of the Constitution of the Russian Federation, are observed.

Results and discussion. When evaluating the central hemodynamics in young men, it was found that after climbing the first step 25 cm high with a frequency of ascents 20 times per minute in 29 young men, the heart rate did not exceed 100% of the initial level, while in 7 young men a hypertonic type of reaction to physical activity was detected (Fig. 2).

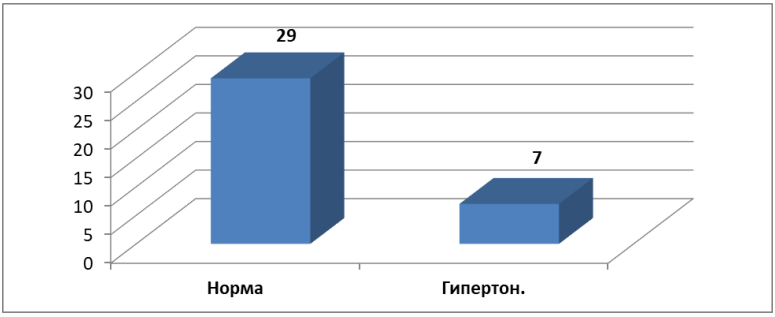

Figure 2. *Heart rate in young men of the main group.*

We should especially note that during a 3-minute rest while sitting on a step in young men, we revealed arrhythmic work of the heart, when the range of heart rate fluctuations varied within 5-7 beats. When studying SBP in 6 young men, its increase by more than 35 mm Hg was revealed in relation to the initial level, which is also regarded by us as a hypertonic type of reaction of the cardiovascular system to physical activity.

DBP behaved in two ways: in 32 young men it retained its initial values before exercise, and in 4 it decreased by 4-8 mm Hg.

The study of central hemodynamics for 10 minutes after the second physical activity indicated that for 5-8 minutes the heart rhythm disturbance persisted, which returned to normal only by 10 minutes of rest. As for the SBP, we noted its normalization, i.e. recovery to the original value, but only at 7 minutes.

In 13 young men in the CG after the first dosed physical activity, the heart rate did not exceed 100% of the initial level, in 5 young men the hypertonic type of

the reaction of the cardiovascular system was detected, and in 4 - the hypotonic type (Fig. 3).

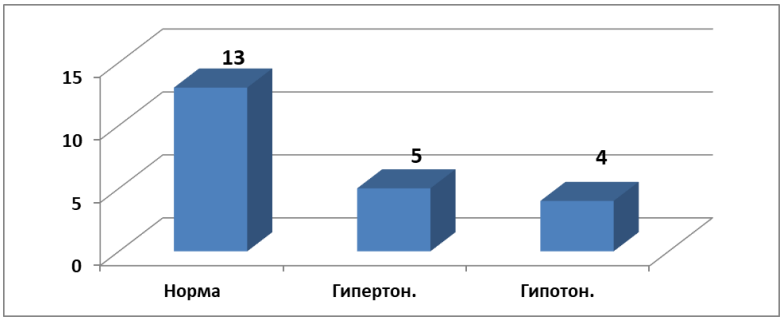

Figure 3. *Systolic blood pressure in boys of the control group.*

Such an unstable state of central hemodynamics is regarded by us as, firstly, a manifestation of hormonal restructuring in accordance with the transitional period of human ontogenesis from the period of youth to the period of the first mature age. Secondly, we assumed that from a physiological point of view, physical activity, especially during overtraining, in accordance with the doctrine of the dominant of Academician A.A. Ukhtomsky, does not give a rigid interaction between the respiratory and cardiovascular systems, i.e. their kind of "coupling" during rest, which leads to a decrease in the tone of the nervous system. These changes, in our opinion, are associated with fatigue of the nerve centers that regulate the activity of the cardiovascular system and muscle function. We believe that during physical activity, the functional circulatory system and muscle regulation, as the dominant systems, are informationally actively interconnected. But with fatigue of the nerve centers (during overtraining), the regulatory role of the dominant in achieving the goal according to the physiological teachings of Academician A.A. Ukhtomsky [8] (muscle load) is weakened, so the circulatory system tends to get out of submission to the dominant goal of muscle work. We believe that even with the initial signs of overtraining or with significant stress, which is especially pronounced after 2 loads for 10-35 minutes, athletes experience wave-like fluctuations in heart rate and blood pressure.

Thirdly, we assumed that during testing, the MG boys had hidden overtraining, manifested by high heart rate and increased SBP. Thus, when evaluating the PP by the step test, it is necessary to analyze the central hemodynamics during the rest period while sitting on the step both after the first physical load and after the end of the test.

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

Research transparency. The study was not sponsored. The authors are solely responsible for providing the final version of the manuscript for publication.

Declaration of financial and other relationships. All authors were involved in topic development, study design, and manuscript writing. The final version of the manuscript was agreed and approved by all authors. The authors did not receive a fee for the study.

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DOI 10.34660/INF.2023.17.73.009

与纹身相关的扁平苔藓的表现
MANIFESTATION OF LICHEN PLANUS ASSOCIATED WITH TATTOOING

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注解。 这篇文章涉及临床实践中的一个案例：一位患者抱怨之前进行的纹身区域发痒，外观发生变化：明显的皮肤增厚，脱皮。临床和形态学检查的结果是，红色素注射区域被诊断为扁平苔藓，是纹身的并发症。

关键词：纹身，色素颗粒，扁平苔藓，角化过度，棘皮症。

Annotation. *The article deals with a case from clinical practice: a patient complained of itching in the area of a previously performed tattoo, a change in appearance: pronounced skin thickening, peeling. As a result of clinical and morphological examination, lichen planus was diagnosed in the area of red pigment injection as a complication of tattooing.*

Keywords: *tattoo, pigment granules, lichen planus, hyperkeratosis, acanthosis.*

Introduction.

Currently, there are publications on the complications that arise after tattooing. Side effects are heterogeneous in nature and are due to traumatization of the skin during the procedure and the toxic-allergic properties of the injected pigment. Most often, the authors point to the development of granulomatous inflammation, the formation of keloid scars, less often to the occurrence of neoplasms [1, 7, 8]. The range of complications after tattooing continues to expand, in this regard, it seems relevant to demonstrate a clinical case of lichen planus after tattooing.

Material and research methods

In May 2017, patient N., 23 years old, applied to the Moscow Scientific and Practical Center for Dermatovenereology and Cosmetology of the Department of Health of Moscow with complaints of an unsatisfactory appearance of the tattoo, thickening of the skin, peeling in the areas where the red pigment was injected, and slight itching.

Anamnesis morbi: The patient considers herself ill for about a year, when, after the tattooing procedure in the area of skin areas with red pigment, 2 months after the procedure, she noted the appearance of peeling, slight itching. She was treated with topical steroids, antihistamines without effect.

Anamnesis vitae: Early development without features. Blood transfusions, surgical interventions, tuberculosis, venereal diseases denies. She had no previous skin diseases, an allergic history was not burdened, no drug intolerance was detected. The epidemiological history is not burdened.

Results and discussion. During the primary objective examination, the patient's condition was satisfactory, no changes in organs and systems were detected.Status localis: in the area of skin areas with red pigment and along the periphery there is dryness of the skin, in the focus - thickening of the skin, large-lamellar peeling was detected on the surface, single large vesiculo-bullous elements (Fig.1).

Figure 1. *Decorative tattoo on the back of the foot. Change in the appearance of the tattoo, thickening of the skin in the area of red pigment, vesiculo-bullous elements, lamellar peeling.*

As a result of the examination, a clinical diagnosis was established: L.43 Lichen red flat. A diagnostic biopsy was performed. Histological examination revealed atrophic changes in the epidermis, smoothing of its outgrowths, against the background of severe hyperkeratosis and acanthosis. In addition, areas of papillomatosis were visualized (Fig.2).

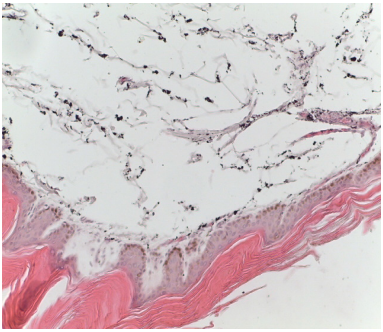

Figure 2. *A fragment of skin with massive hyperkeratosis, acanthosis, with areas of papillomatosis. Diffuse distribution of pigment, pronounced edema. A. Okr. hematoxylin and eosin. About. 10, ok. 20.*

Pigment granules are diffusely located in the dermis, while there was no lymphohistiocytic infiltration. Severe edema led in some areas to detachment of the adjacent dermis from the epidermis, with the formation of gaps, which morphologically corresponds to the pemphigoid form of lichen planus [3].

Final clinical diagnosis: L.43.8 Other lichen planus. The patient was prescribed treatment with intralesional administration of “Diprospan”, topical steroids, reducing agents. Against the background of treatment, regression of the rash within 2 months. amounted to 70% (Fig.3).

Figure 3. *Macroscopic view of lichen planus (at the site of the introduction of red pigment in the tattoo) after a course of treatment. Regression of rashes, lack of progression of the pathological process.*

There is no progression. Currently, he uses Belosalik ointment under an occlusive dressing once a day. with a positive effect - there is no itching, slight swelling, rashes continue to decrease. The presented clinical case of the occurrence of a pathological process at the site of the tattoo does not contradict the literature data

on the comorbidity of lichen planus, causes, clinical forms, histological picture and the basic principles of treatment [2, 4, 5, 6].

Conclusion. The occurrence of lichen planus at the injection site of the red pigment, of course, should be attributed to one of the possible complications of the tattoo procedure and the reaction to the color dye. Thus, it is necessary to develop measures aimed at the prevention of post-tattoo complications and mandatory certification of injected dyes.

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DOI 10.34660/INF.2023.82.23.010

暗剥夺致早衰对睾丸形态结构的影响

THE EFFECT OF PREMATURE AGING CAUSED BY DARK DEPRIVATION ON THE MORPHOLOGICAL STRUCTURE OF THE TESTES

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注解。 现代世界的发展日新月异，影响着社会的发展，尤其是人们的日常生活。 加快智力和技术进步的步伐导致出现各种类型的污染——光、声音、信息，其副作用之一是睡眠障碍，对人的身体状况产生负面影响。 黑暗剥夺引起的睡眠障碍导致血清中睾丸激素水平下降。 雄性激素的失衡，其合成受下丘脑 - 垂体系统的控制，对睾丸的形态功能状态产生负面影响。 以4月龄白色杂种雄性大鼠30天暗剥夺早衰模型为研究对象，研究了4月龄白色杂种雄性大鼠睾丸曲曲精管生精上皮细胞、支持细胞、间质内分泌细胞的形态功能状态。 结果发现，睾丸的形态变化表现为暗剥夺后 30 天生精上皮厚度、支持细胞面积、间质内分泌细胞及其细胞核的减少，并伴有 Clotho 水平的降低。 蛋白质，这是由黑暗剥夺引起的过早衰老的标志。

关键词：睾丸，暗剥夺，衰老，内分泌器官，Klotho 蛋白。

Annotation. The development of the modern world is taking place at a rapid pace, which affects the development of society and, in particular, the daily life of a person. Increasing the pace of intellectual and technical improvement leads to the emergence of various types of pollution – light, sound, information, one of the side effects of which is sleep disturbance, having a negative impact on the physical condition of a person. Sleep disturbance caused by dark deprivation leads to a decrease in testosterone levels in the blood serum. The imbalance of male sex hormones, the synthesis of which is under the control of the hypothalamic-pituitary system, negatively affects the morphofunctional state of the testes. The morphofunctional state of the spermatogenic epithelium, sustentocytes, interstitial endocrinocytes of the convoluted seminal tubules of the testes of 4-month-old white mongrel male rats was studied on the model of premature aging caused by 30-day

dark deprivation. It was found that morphological changes in the testes were characterized by a decrease in the thickness of the spermatogenic epithelium, the area of sustentocytes, interstitial endocrinocytes and their nuclei for 30 days after dark deprivation, which was accompanied by a decrease in the level of Clotho protein, which is a marker of premature aging caused by dark deprivation.

Keywords: *testis, dark deprivation, aging, endocrine organs, Klotho protein.*

Introduction

In modern conditions, the problem of protecting the reproductive health of the population is of acute social importance. Today, the demographic situation is characterized by low reproductive potential and premature "aging" of men and women of young fertile age, which does not allow predicting an increase in fertility.

The modern socio-cultural environment is characterized by a high pace of life, which often leads to the impact on a person of such risk factors of accelerated aging as light pollution associated with increased illumination of megacities, a shift in the normal cycle of activity and recreation in the conditions of the ongoing information revolution, against the background of psychosocial stress (constant availability of modern means of communication, etc.). The mismatch of circadian rhythms as a result of a violation of the natural photoperiod leads to the development of light desynchronosis, which, in the light of the concept of the general adaptation syndrome, is considered as a powerful stress factor that affects the entire body as a whole [4] and the reproductive system of the human body and animals in particular. The combination of these factors leads to the development of accelerated aging, one of the socially, clinically and demographically significant consequences of which is a violation of reproductive health, which in young people is aggravated by the stress of social maladaptation. The relevance of this problem is also given by the fact that the young active population of fertile age is more susceptible to the effects of these factors.

The problem of stress in humans and its impact on the male reproductive system attracts the attention of specialists in various fields of science. Social, psychological stress, stress caused by light desynchronosis leads to suppression of steroidogenic and spermatogenic function of testicles and reproductive dysfunction [1]. The imbalance of male sex hormones, the synthesis of which is under the control of the hypothalamic-pituitary system, negatively affects the morphofunctional state of the testes [2, 3].

The aim of the study was to evaluate morphofunctional changes in testes in rats after dark deprivation.

Materials and methods

The studies were carried out in the laboratory of toxicology of NCILS Volg-SMU on 12 experimental and 6 control sexually mature male rats aged 4 months,

obtained from the nursery of the Stolbovaya branch of the Federal State Budgetary Institution of the National Research Institute of the FMBA of Russia. The experiments were carried out taking into account ethical standards and recommendations for the humanization of work with laboratory animals (GOST 33044-2014, "European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Purposes"). The conducted research was approved by the local ethics committee (Protocol No. 2022/164 of 11/25/2022). The temperature regime of the vivarium room from +18 to +22 C, relative humidity of 40-50% were observed. Modeling of dark deprivation was carried out by placing animals of experimental groups for 30 days in conditions of constant artificial lighting (300 Lux). Individuals of the control group were placed indoors in a similar time mode, but with a 12-hour light mode. The animals had free access to water and food. Then 6 animals of the experimental group were euthanized, and 6 animals were placed indoors at 12-hour light mode for 14 days, followed by euthanasia, testicular sampling for histological examination and staining with hematoxylin according to Mayer and eosin. Histological preparations were examined and visualized using a Leica DM 1000 microscope (Germany) and specialized LAS v image capture and settings management software.4.7. In order to take blood from animals to study the content of melatonin in the serum, rats were anesthetized by a single intraperitoneal administration of chloral hydrate (400 mg/kg) in purified water in a volume of 10 ml/kg. Blood sampling was carried out from the abdominal aorta of rats. After blood sampling, the animals were euthanized by decapitation using a guillotine (Open Science LLC, Moscow, Russia). To stabilize the blood, a 3.8% aqueous solution of sodium citrate was used in a ratio of 9:1. To study the level of melatonin, blood serum was obtained by centrifugation at 3000 rpm for 20 minutes. Blood serum aliquots were frozen and stored at -20°C.

Using a solid-phase enzyme immunoassay, the concentration of Klotho protein in blood serum was determined using a set of ELISA Kit for Klotho (KL) reagents manufactured by CLOUD-CLONE CORP. (USA) on an automatic microplate photometer Sunrise TS4TECAN (Austria).

Statistical processing of the results was carried out using GraphPad Prism 8.0 software. Statistical hypotheses were tested using nonparametric criteria using multiple comparison of subgroups (ANOVA Kraskel-wallis, test Dunn). The changes were considered statistically significant at $p<0.05$.

Results and discussion

The morphometric analysis showed that male rats after 30-day dark deprivation showed premature aging of the reproductive system with inhibition of spermatogenesis, which was accompanied by a decrease in the thickness of the spermatogenic epithelium by 26.3% ($p<0.001$). Spermatocytes of the 1st order were located unevenly, preserving their morphological characteristics and closely

adjacent to spermatogonies. Second-order spermatocytes were not observed in all convoluted seminal tubules and their number decreased significantly, which may indicate hypotrophy of the spermatogenic epithelium.

Morphological changes were also detected in the sustentocytes (Sertoli cells), which was characterized by a slight decrease in the number and area of Sertoli cells by 5.4% and 12.4%, respectively. Morphometric analysis of interstitial endocrinocyte cells (Leydig cells) showed a significant decrease in their area and nuclei by 26.9% and 21.7% ($p<0.001$).

14 days after the cessation of exposure to light desynchronosis, the restoration of cell populations of the spermatogenic epithelium was observed, which is accompanied by an increase in its thickness by 20.1%. There was also an increase in the number of sustentocytes, their area and nucleus by 4.8%, 10.1% and 5.6%, respectively. The sustentocytes had a pyramidal shape and were located on the basement membrane, maintaining their connection with the spermatids. At the same time, an increase in the area of Leydig cells and their nuclei was revealed by 14.95% ($p<0.001$) and 20.72% ($p<0.001$), respectively, compared with the positive control group.

30-day dark deprivation led to a statistically significant decrease in the level of Clotho protein in the blood of animals in relation to this indicator of the control group by 1.7 times. 14 days after the cancellation of dark deprivation in rats, there was a tendency to increase the level of Clotho protein, but no recovery to control values was observed. The differences of this indicator in the control group and the experimental group remained statistically significant with a difference of 1.56 times.

The data obtained indicate that 30-day dark deprivation leads to morphological changes in the testes, changes the population of spermatogenic cells, sustentocytes and interstitial endocrinocytes, which can be a critical cause of male reproductive dysfunction. A decrease in the level of Clotho protein, which is one of the markers of aging, indicates that prolonged continuous exposure to light leads to pathological shifts that characterize premature aging, given the 5-month age of animals.

Conclusion. Thus, the impact of such negative factors on the testes as prolonged stress caused by light desynchronosis, namely dark deprivation, leads to the occurrence of such nonspecific changes as thinning of the spermatogenic epithelium, a decrease in the number of spermatogenic epithelial cells, damage to interstitial endocrinocytes, followed by their partial recovery after the cessation of negative effects. At the same time, there is a decrease in the level of Clotho protein, which is a marker of premature aging caused by light desynchronosis.

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DOI 10.34660/INF.2023.30.48.011

梗死后慢性心力衰竭的不同亚型
DIFFERENT SUBTYPES OF POSTINFARCT CHRONIC HEART FAILURE

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抽象的。 我们根据新西伯利亚市第二临床医院心肌梗死科室收治患者的相关资料，分析了临床、功能、生化等预后指标对梗死后心力衰竭综合征发生发展的影响。 1.

关键词：慢性心力衰竭，心肌梗死。

Abstract. *We analyzed the informativity of some prognostic indicators: clinical, functional, biochemical with regard to their influence on the development of postinfarction heart failure syndrome on the basis of relevant materials about the patients treated at the department for MI patients of Novosibirsk City Clinical Hospital No.1.*

Keywords: *chronic heart failure, myocardial infarction.*

Introduction

Despite significant advances in ACS treatment, primarily due to the introduction of reperfusion technologies allowing to reduce the area of necrosis by about 50% compared to the pre-perfusion era [1], heart failure develops within 5 years after the first myocardial infarction in 8-10% of men and 2 times more often in women under 65 years of age [2]. However, it should be recognized that at present there is no system for assessing the risk of postinfarction heart failure, and therefore there is no effective management of this risk, which makes this work urgent.

Purpose of the study

To evaluate the influence of clinical, biochemical and functional parameters on the development of chronic heart failure in patients with myocardial infarction.

Materials and methods

Prospective non-randomized parallel-group analysis of 186 suffered MI (mean age 63.5 y) during one year was performed in this work, and in the main group of patients (86 patients) at 30 days after MI, chronic heart failure over 1FC by NYHA

was confirmed, and in comparison group (100 patients) CHF was either absent or did not exceed 1F by NYHA. The diagnosis of MI and CHF was made according to national and European guidelines [3-6]. Both groups received standard therapy for CHF: ACE inhibitors/angiotensin 2/angiotensin receptor antagonists and neprelysin inhibitor (ARNI), β-blockers, mineralocorticoid receptor antagonists (AMCR), SGLT2-receptor inhibitors; anticoagulants, antiplatelet agents, statins, diuretics if necessary were also used.

Results and discussion

The study assessed the influence of various factors on the development of postinfarct chronic heart failure (CHF) diagnosed at day 30 by odds ratio (OR) method. Significant correlations were obtained for the following factors: history of guideline-confirmed CHF before MI: OR 10.208, CI (5.114-20.379), LV EF less than 40% OR 6.831, CI (1.905-24.491), presence of atrial fibrillation (AF) OR 6.831, CI (1.905-24.491). Other parameters such as smoking, BMI, type 2 diabetes mellitus, dyslipidemia, tachycardia, hypotension, and many others did not significantly affect the development of CHF. Since all patients were treated according to the "gold standard" of MI treatment - primary angioplasty with stenting within the first 2 hours from the onset of symptoms in the presence of ST elevation on ECG, and in its absence - the patients were managed according to the protocol of STEMI management, and thus underwent PCI with stenting within 1-3 days, this factor did not manifest itself with regard to posttinfarction CHF formation.

Cardiac failure phenotypes were determined in the studied patients according to LV EF value at 30 days of MI in the main group: 15 (17.4%) patients fell into subtype with decreased LV EF, 49 (56.9%) - with slightly decreased LV EF, and 22 (25.7%) - with preserved LV EF. In the comparison group, these parameters were 3 (3%), 50 (50%), and 47 (47%), respectively. One year later the transformation of these CH phenotypes occurred as follows: in the main group 12 (13.9%) patients referred to the subtype with decreased LV EF, 52 (60.4%) - with slightly decreased LV EF, and 22 (25.7%) - with preserved LV EF. In the comparison group, these parameters were 0 (0%), 53 (53%), and 47 (47%), respectively. Thus, in both studied subgroups of patients there was a transition from the subtype with reduced LV EF to the subtype with preserved LV EF. When analyzing the possible causes, we can note the use of valsartan/sacubitril for a year in patients from the main group. There was no statistically significant influence of any factors in the comparison group; however, these three patients were younger than the average for the group, had no concomitant pathology.

The next stage of the study determined one-year outcomes. "Endpoints" were assessed in 186 patients: 8 cases of death from cardiovascular causes, 10 nonfatal myocardial infarctions, 16 unscheduled CTCA with stenting, 3 strokes; 24 cases of hospitalization due to decompensation of CHF were recorded. Significant in-

fluences on the development of adverse one-year outcomes were: age older than 65 years - OR 3.029 (1.183-7.752), chronic kidney disease stage II or higher - OR 2.844 (1.132-7.145), LV EF <40% - 19.139 (3.935-93.089), AF - OR 7.235 (2.416-21.667).

In a population-based cohort study [7], which included a mean follow-up of 7.6 years, the mortality rate among patients who developed CHF after MI was 70%, whereas it was 28% among patients who did not develop CHF during MI. In addition, patients who developed CHF after hospital discharge after having had a MI had a worse prognosis than those who developed CHF during hospitalization for MI, which emphasizes the need to consider patients' comorbidity and adherence to secondary prophylaxis.

Conclusions

In the present study factors of formation of postinfarct chronic heart failure were investigated. It is shown that not all patients having signs of acute heart failure according to Killip further demonstrate chronic CHF. Restoration of blood flow in ischemic myocardium due to primary angioplasty with stenting certainly, along with optimal drug treatment, reduces the zone of primary ischemia, which reduces the risk of late postinfarction remodeling and formation of CHF. In this regard, in addition to mechanical factors, such as an increase in pre- and post-load due to the uneven contraction of the injured and intact myocardium, other factors further manifest themselves, and above all, the concomitant pathology. All these complex mechanisms are reflected in the fact that the most significant factors associated with posttinfarction CHF were EF less than 40%, the presence of atrial fibrillation and the presence of confirmed any form of CHD in the preinfarction history.

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DOI 10.34660/INF.2023.43.63.012

基于小波变换的卷积神经网络用于多尺度衍射图分析
CONVOLUTIONAL NEURAL NETWORKS BASED ON WAVELET TRANSFORM FOR MULTISCALE DIFFRACTOGRAM ANALYSIS

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抽象的。 衍射分析在材料科学中广泛用于研究材料的晶体结构和表面状态。小波变换允许您将信号分解为不同的尺度并减少噪声，同时保留有关信号结构的信息。 在小波变换数据上训练的神经网络可以有效地处理衍射图案，同时考虑到不同的尺度和数据结构，增加了在处理数据的速度和数据量方面进行简单变换的可能性。

关键词：衍射图案、小波变换、神经网络、机器学习、卷积神经网络、多尺度分析、小波分析、垃圾处理。

Abstract. *Diffractometric analysis is widely used in materials science to study the crystal structure and state of the surface of materials. The wavelet transform allows you to decompose the signal into different scales and reduce noise, while maintaining information about the signal structure. Neural networks trained on wavelet-transformed data can efficiently process diffraction patterns, taking into account different scales and data structure, increasing the possibilities of simple transformation in the speed and volume of data being processed.*

Keywords: *diffraction pattern, wavelet transform, neural networks, machine learning, convolutional neural networks, multiscale analysis, wavelet analysis, trash holding.*

Recently, convolutional neural networks have gained immense popularity in the field of image analysis and experimental data. However, when dealing with multi-scale data, such as X-ray diffraction patterns, there is a need for methods

that can work efficiently with multi-scale data. This article describes the method of convolutional neural networks based on the wavelet transform for multiscale analysis of diffractograms.

Convolutional neural networks based on wavelet transform are used to process images, audio signals and experimental data. In this method, as the core of the neural network, the wavelet transform is used - a mathematical process that allows you to decompose the original signal into components of various scales. Each decomposed signal is a dataset of only a certain scale.

In wavelet-based convolutional neural networks, each layer of neurons performs a convolution on each dataset in the sample. In this case, the size of the filter for convolution is chosen in such a way that the size of the filter is less than the size of the original array. An activation function is also used, which adds non-linearity to the data processing process [1].

After performing the convolution and applying the activation function, subsampling occurs, which allows you to reduce the dimension of the data by selecting only the most significant features for future processing. Saving features allows you to reduce the time spent on processing subsequent diffractograms.

The main advantage of convolutional neural networks based on wavelet transform is the ability to work with data of many scales. This method makes it possible to increase the accuracy of data analysis at all scales and highlight specific features that are not visible when using other methods. And also, the selection of layers and scales on which you can most effectively remove noise and artifacts.

The method of convolutional neural networks based on the wavelet transform can be used to process diffractograms and obtain information about materials based on the analysis of their structure. This method provides increased accuracy of data analysis and identification of specific features that are important for the phase analysis of the sample. As a result, wavelet-based convolutional neural networks are an effective method for full-profile analysis of diffractograms.

The article gives an estimate of the increase in the efficiency of processing diffraction patterns when using convolutional neural networks in the wavelet transform code. As a rule, the conventional algorithms that were used earlier had a number of significant drawbacks: they required constant human intervention (entering initial parameters, monitoring and correcting the progress of execution, analyzing the processed data), complete recalculation of transformations and filtering parameters, and a significant increase in the time spent on processing large amounts of data. Additionally, methods and algorithms previously had low flexibility and adaptability to new and non-standard input data, basic capabilities for operating arbitrary-form input information.

A partial solution to each of the questions was achieved using machine learning. Using the processed database of diffraction patterns, it was possible to grad-

ually form templates and patterns on which the further analysis of experimental data was based. Thanks to the abstract representation of the algorithms and input data, the problems with normalization to the basis and the reduction in the need for adjustment and constant control of processing were solved. Compilation of convolutional and pooling layers gradually reduced the processing time of diffractograms and the classification of features (intensities, angles, half-width of reflections, a set of interplanar distances, crystalline phases, quantitative phase analysis, crystal lattice parameters). It is worth noting that the analysis of qualitatively new data sets, however, is assumed with a high probability that with a large database for machine learning and selection of neural structure weights, a sufficient number of variations will be covered to steadily reduce processing time with an increase in its efficiency.

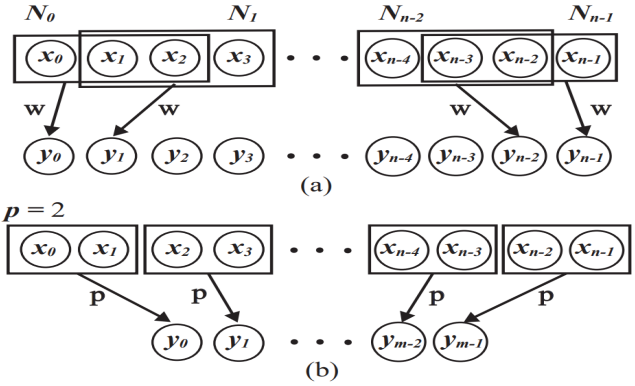

Figure 1. *Concepts of convolution and mean pooling of layers. (a) Convolution layers calculate the weighted sum of their neighbors. (b) Merging layers take the average and perform downsampling.*

Convolutional Neural Networks [3], in addition to using an activation function and a fully connected layer, CNNS implement convolution/pooling into layers. The diagram (Figure 1) illustrates the configuration which is explained below.

Convolution Layers: Given an input vector with *n* components x = (x_0, x_1, . . ., x_{n-1})$\in \mathbb{R}^n$ convolution layer outputs a vector with this many components y = (y_0, y_1, . . ., y_{n-1}) $\in \mathbb{R}^n$:

$$y_i = \sum_{j \in N_i} \omega_j x_j \quad (1)$$

where Ni – set of neighbor indices in xi, a wj – weight. Following the notation convention in CNNs, consider that wj includes bias, having a constant input

of 1. Thus, the equation says that each output yi is a weighted sum of neighbors $\sum_{j \in N_i} \omega_j x_j$ plus a constant.

Each layer defines the weights wj as constants over i. By sharing parameters, CNNs reduce the number of parameters and achieve translational invariance in image space. The definition of yi in equation (1) is equivalent to convolving xi through the filter kernel wj, so this layer is called the convolution layer. So we can rewrite yi in equation (1) using the convolution operator * as

$$y = x * w \tag{2}$$

where w = (w0, w1, . . ., wo−1) $\in \mathbb{R}^o$.

Pooling layers: Pooling layers are usually used immediately after convolution layers to simplify information. Next, we focus on pooling the means, which allows us to see the relationship with the multi-resolution analysis. Given an input data x $\in \mathbb{R}^n$, middle union outputs a vector with fewer y components y $\in \mathbb{R}^m$ as

$$y_i = \frac{1}{p} \sum_{k=0}^{p-1} x_{pj+k} \tag{3}$$

where *p* defines join support, a $m = \frac{n}{p}$. For example, *p* = 2 means we reduce the output to half the input using pairwise averages. Using the standard downsampling operator ↓, we can rewrite equation (3) as

$$y = (x * p) \downarrow p \tag{4}$$

where **p** = (1/p, . . ., 1/p) $\in \mathbb{R}^p$ represents the averaging filter. The middle pool mathematically involves convolution through p followed by downsampling.

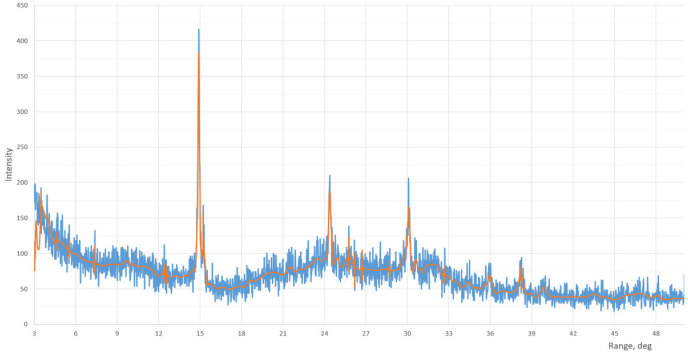

Figure 2. *Diffractogram* $CaC_2O_4(H_2O)$ *with superimposed thresholding based on the wavelet transform.*

One of the important factors in the use of wavelet decomposition is the ability to select a coefficient for each scale [2]. This makes it possible to isolate local features from a noisy diffraction pattern. The diffraction pattern (Fig. 2) demonstrates one of the results of revealing “hidden” reflections; in this case, this greatly facilitates finding the phase composition of the sample from the reference database.

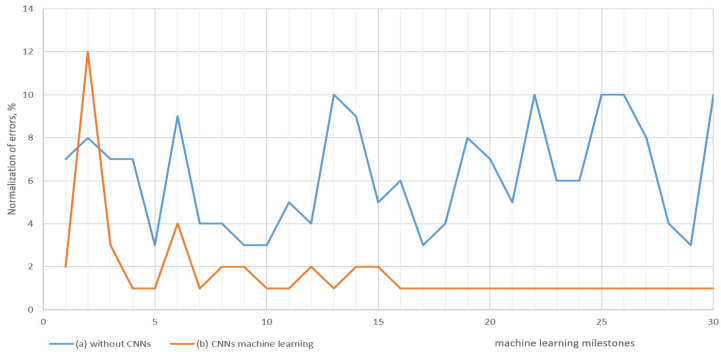

Figure 3. *The ratio of the normalized error in % to the main stages of machine learning. The magnitude of the error (a) without using the neural network and (b) with it.*

First, the reduction in the processing error of diffractograms was evaluated using machine learning. The results presented in fig. 3 showed a decrease in the error by an average of 4–6%, which has already made it possible to increase the accuracy of recognition of reflections and phase structure. However, positive results are observed in the case of repeated processing of diffractograms with a similar configuration and phase composition.

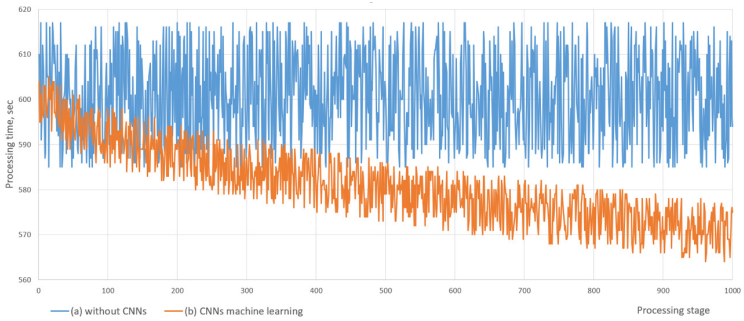

Figure 4. *Relation of processing time to machine learning steps. The amount of time (a) without using the neural network and (b) with using it.*

Secondly, it was possible to reduce the time spent on multiple processing of one diffractogram, this improvement is necessary to cover large initial parameters and operate coefficients in a wider range. This is an integral part of the algorithm for selecting weights and noise reduction confidants. The gradual decrease in processing time is shown in the graph (Fig. 4).

Results: despite a small sample of data and databases of diffraction patterns, it was possible to note the main points of the introduction of convolutional neural networks in the methods of processing and analyzing diffraction patterns:

1. The formation of convolutional layers, pools and databases, the selection of coefficients and weights of the neural network takes time and is an individual process for each task.
2. Despite the time wasted in the first stage, further processing can be significantly accelerated, consumes less system resources, while maintaining flexibility and adaptability.
3. The error of the processing result, with unchanged parameters, time and load on the computing processor, can be underestimated by 4-6%, and has the ability to further decrease.
4. Thanks to the creation of pooling layers and classification of features into groups, further processing and analysis of data is greatly facilitated.
5. The adaptability and learnability of the forms of neural networks makes it possible for the algorithm / computer to independently determine and correct the parameters, increasing the accuracy and speed of operations.

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DOI 10.34660/INF.2023.65.62.013

改善饮用水生产膜设备的运行：减少试剂消耗和浓缩物处理
IMPROVING THE OPERATION OF MEMBRANE PLANTS FOR DRINKING WATER PRODUCTION: REDUCTION OF REAGENT CONSUMPTION AND CONCENTRATE DISPOSAL

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抽象的。 描述了新开发的技术，以降低运营成本并集中排放用于处理地下水以生产饮用水的膜设施。 该技术方法包括用纳滤膜替代反渗透膜。 纳滤膜的应用降低结垢率，减少浓液排放。 还可以减少阻垢剂用量，从而降低运营成本。进行了处理地下水以降低硬度和氨的实验。 在膜阵列的每个膜模块中的膜通道中确定缩放速率。 还预测了取决于系数 K 值的每个膜组件产生的产品水的组成。 获得的主要实验关系使我们能够计算达到设计回收值所需的膜元件数量。对于地下水成分的某些例子和选定的膜设施设计，确定了水处理膜设施的主要技术参数。 纳滤膜的使用减少了 40% 的运营成本，因为它减少了防垢化学品的消耗、电力消耗和浓缩物排放。 研究表明，在现有膜设施中用纳滤膜替代反渗透膜可使产水流量增加 40-50%，而无需改造和增加设计。 产品水质保持在同一水平，符合 WHO 标准。 精矿排放量也减少了 10 - 20 倍。 还表明，纳滤膜的使用在较低压力下提供了对钙和氨的排斥，这也提供了较低的结垢率并确保在较高回收率下的安全操作。 拟议的现代化技术仅在不干扰膜设施设计的情况下更换膜，即可将运营成本降低 40-50%。

关键词：反渗透； 纳滤； 阻垢剂； 膜表面结垢； 减少浓缩液流量； 去除硬度； 除氨； 除氟。

Abstract. *New developed technology is described to reduce operational costs and concentrate discharges of membrane facilites used for treatment of ground water to produce drinking water. This technological approach consists of replacement of reverse osmosis membranes by nanofiltration membranes. Application of nanofiltration membranes reduces scaling rate and reduce concentrate discharge. Antiscalant dosage can be also reduced that can reduce operational costs as well. Experiments were conducted to treat ground water to reduce hardness and ammonia. Scaling rates were determined in membrane channels in every membrane module of the membrane array. Composition of product water produced by each membrane module depending on coefficient K value was also predicted. Main experimental relationships were obtained that enables us to calculate membrane elements numbers required to reach the designed recovery values. For the certain example of ground water composition and for the selected membrane facility design main technical parameters of water treatment membrane facility were determined. The use of nanofiltration membranes provided reduction of operation costs by 40 per cent due to lower consumption of antiscaling chemicals, lower power consumption and lower concentrate discharge. The research demonstrated that replacement of reverse osmosis membranes by nanofiltration membranes at the existing membrane facility provides increase of product water flow by 40 – 50 per cent without reconstruction and increase of design. Product water quality remains on the same level and corresponds to WHO standards. Also concentrate discharge is reduced by 10 – 20 times. It is also demonstrated that the use of nanofiltration membranes provides rejection of calcium and ammonia at lower pressure that also provides lower scaling rates and ensures safe operation at higher recoveries. The proposed modernization techniques provide reduction of operational costs by 40 – 50 per cent only due to membrane replacement without interference with membrane facility design.*

Keywords: *reverse osmosis; nanofiltration; antiscalants; scaling on membrane surface; concentrate flow reduction; hardness removal; ammonia removal; fluoride removal.*

INTRODUCTION. PRINCIPLES OF TECHNOLOGICAL SCHEMES DESIGN.

Traditionally, for the purification of groundwater in the Moscow region, iron removal facilities were mainly built that were, based on the use of aeration processes followed by filtration [1, 2]. But a number of wells give water with a high iron and hardness concentrations. The use of reagent or ion-exchange methods for water softening requires high operating costs for reagents purchase [3–5]. In addition, ion-exchange softening systems (sodium cationization) produce highly mineralized effluents, which creates the problem of their discharge [3]. In addition to iron and hardness ions traditionally found in the groundwater of the Moscow

region, a number of underground water intakes contain elevated levels of fluoride ions, ammonium ions, nitrate ions, strontium, lithium, arsenic, and even boron [4]. With the advent and expansion of the use of the reverse osmosis method for water desalination, water treatment for industrial purposes, its effectiveness for improving the quality of groundwater used for drinking water supply became obvious [6, 7]. The reverse osmosis method allows you to "universally" retain any contaminants in the ionic form from the water: fluorides, strontium, lithium, ammonium. Over the past 10 years, a lot of installations using reverse osmosis process appear that treat water from wells with a high content of hardness, strontium, fluorine, and other contaminants, as well as with increased mineralization (the value of the total salt content is above 1000 mg/L) [3]. The experience of operating the first reverse osmosis units in the Moscow region revealed two main problems: high costs to purchase service chemicals (to prevent calcium carbonate precipitation) and to discharge concentrates into the city sewerage system [4, 5].

To obtain high-quality drinking water at water treatment facilities using reverse osmosis membranes, a conventional technological scheme is used, which can be recognized as the cause of all the problems associated with high operating costs and concentrate discharge costs (Figure 1). Traditionally, suppliers of reverse osmosis plants use iron removal according to the "classic" conventional approach (using aeration and filtration) as a pretreatment, after which water enters the reverse osmosis unit, where it is separated into permeate and concentrate streams. For the cases when ground water in Moscow region is treated that has TDS content of 600 - 800 mg / L and a total hardness of 8 - 12 meq / L using reverse osmosis membranes, a permeate is obtained with a total salt content of 15 - 20 mg / L and a hardness value of 0.05 - 0 .1 mg/L. Permeate is then mixed with the feed water that has undergone iron removal in a ratio of 1:1, then water with a total salt content of approximately 300–500 mg/L and a total hardness value of 5–7 mg-eq/L is obtained.

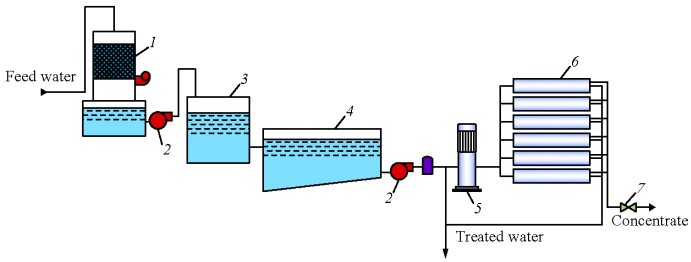


Figure 1. *A flow diagram of a ground water treatment system using reverse osmosis: 1 - aeration column; 2 - booster pump; 3 - rapid sand filter; 4 - pure water tank; 5 - working pump of reverse osmosis facility; 7 - pressure regulation valve;*

The majority of reverse osmosis systems used for drinking water supply are developed and operated using the described principles [1, 6, 7]. In many ground water intakes often the water contains excessive turbidity, iron, hardness, lithium, strontium and fluoride. In this paper, as an example, we consider the modernization of a water treatment plant installed at the «Botakovo» district of the Troitsk town in the Moscow region. The total capacity of the station for treated water is 135 m3/h. The production of drinking quality water is carried out using mixing of reverse osmosis permeate with ground water after iron removal in the ratio: 35 m3/h of iron-free feed water per 100 m3/h of permeate of the reverse osmosis unit. The reverse osmosis unit is designed to reduce the hardness and ammonia content. Concentrate flow value is 25 - 28% of the feed water flow.

Depending on the concentrations of other contaminants that are contained in the ground water (fluoride, ammonia ions, etc.) and the efficiency of their retention by reverse osmosis membranes, the blending ratio of the flows (feed water after iron removal and reverse osmosis permeate) may change.

The problem of high operational costs occurs due to the risk of calcium carbonate scaling in membrane modules that results in reduction of membrane product flux during ground water treatment. Due to the high content of calcium ions, the recovery values of membrane facilities (determined as the ratio of product flow to the feed water flow rate) usially do not exceed 0.65 - 0.75. An increase in the recovery causes an increase in the calcium carbonate supersaturation value in the concentrate flow and an increase of the scaling hazard [7]. A necessary component of the technological scheme is the antiscalant dosing equipment to prevent scale formation [8, 9]. The reverse osmosis facilities operational experience has shown that complete scaling prevention [10, 11], cannot be achieved with the use of any type of antiscalant [10-13]. It has been shown throughout long research and operating experience [12, 14], it is most efficient and rational to use nanofiltration membranes that have been specially developed for the purposes of drinking water supply [15, 16]. The use of nanofiltration membranes provides a sufficient reduction of operational costs due to scaling reduction and increase of recovery values [10,12,14, 15], which can significantly reduce operating costs and improve the reliability of membrane installations in drinking water supply systems [17, 18].

In this article authors intented to demonstrate the advantage of nanofiltration membranes for the purpose of groundwater treatment for drinking water supply. The scheme was developed by the authors for the treatment of groundwater using nanofiltration membranes, which makes it possible to radically reduce the consumption of the concentrate [16, 17]. A distinctive feature of the developed technology for reducing concentrate consumption is the use of the second stage of concentrate processing, which uses nanofiltration membranes with a low selectivity values (Figure 2). Due to the low rejection of membranes at the second stage,

the processes of sedimentation in membranes of the second stage proceed slowly [4, 17]. In this case, the permeate of membrane apparatuses of the second stage, which is of low quality and whose composition is close to the composition of the source water, is sent to the inlet to the installation.

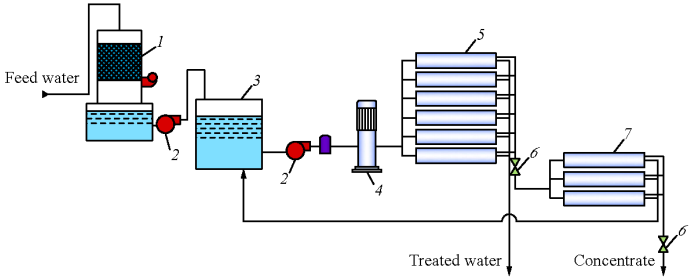


Figure 2. *A flow diagram of ground water treatment using nanofiltration membranes and specially designed modules for concentrate flow reduction: 1 - aeration column; 2 - booster pump; 3 - sand rapid filter; 4 - membrane facility working pump; 5 - nanofiltration membrane array; 6- pressure regulation valve; 7 - membrane modules for concentrate flow reduction.*

(a)

(b)

Figure 3. *A membrane plant in Botakovo, Moscow region. Product capacity is 140 cubic meters per hour. a)- membrane array of 9 pressure vessels; b: high pressure centrifugal pump*

Nanofiltration membranes operate at a pressure of 1.0 MPa, which gives a significant reduction in the cost of electricity compared to reverse osmosis membranes, which are operated at a pressure of 1.6 MPa. The use of nanofiltration membranes can significantly reduce the rate of precipitation on the membranes and thus reduce the cost of the inhibitor and cleaning solutions. The dose of the inhibitor in the case of using nanofiltration membranes is 1 g/m3, and the frequency of chemical washings is reduced by 3 times compared with the use of reverse osmosis membranes. In the case of using nanofiltration membranes, a larger volume of water is subject to treatment in a membrane plant, but the cost of replacing membranes is lower than the cost of electricity and reagents. Additional savings are obtained by reducing the cost of discharging concentrate into the city sewer.

The only way to reduce operating costs is to replace reverse osmosis membranes with nanofiltration ones. Nanofiltration membranes have a greater “resistance” to sedimentation - sedimentation rates in nanofiltration devices are several times lower than in devices with reverse osmosis membranes with the same composition of treated water. This makes it possible to operate the plants at reduced doses of inhibitors, with a longer filter cycle, and at reduced concentrate consumption.

MATERIALS AND METHODS. EVALUATION OF OPERATIONAL PARAMETERS OF MEMBRANE PLANT: SCALING RATES, PRODUCT WATER QUALITY, PERFORMANCE PROGNOSIS.

The purpose of the experiments was to substantiate the possibility of production of high quality water and reducing operating costs when after replacement of reverse osmosis membranes by nanofiltration ones with a low rejection characteristics. The tests were carried out using serial membrane elements of type models manufactured by CSM (Korea). The experiments were carried out using the water of the Botakovo water intake in Moscow region. Industrial membrane modules of the 4040 standard with reverse osmosis membranes BLN (salt selectivity 95–96%) and nanofiltration membranes 90 NE and 70 NE models (selectivity 90% and 70%, respectively) manufactured by CSM (Korea) were used for these experiments. In the course of the experiments, the compositions of purified water were determined in each membrane element of the scheme, and scaling rates in each element of the scheme were determined (Fig. 1). When conducting experiments to determine the scaling rates on the membranes, the most popular antiscalant used in drinking water production with “Aminat-K” trademark produced by NPO “Travers” (Moscow) was added to the feed water. The recommended inhibitor dose was 5 mg/L.

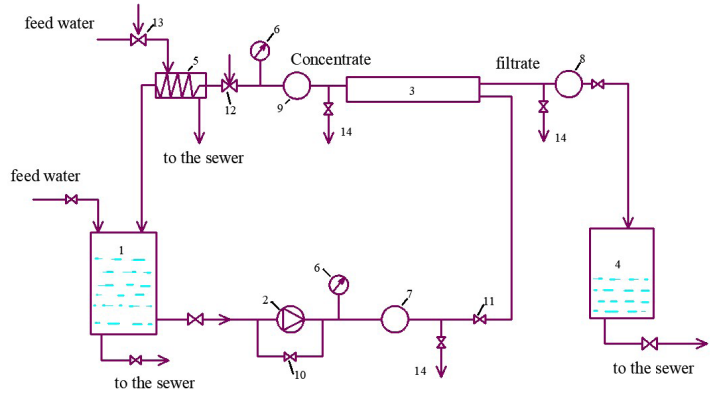


Figure 4. *A flow diagram of a test unit with reverse osmosis and nanofiltration membranes: 1 – feed water tank; 2 – feed pump; 3 – spiral wound membrane module in pressure vessel; 4 – product water tank; 5 – heat exchanger; 6 – pressure gauge; 7 – feed water flow meter; 8 – product water flow meter; 9 – concentrate flow meter; 10 – bypass flow regulation valve; 11 – feed water flow regulation valve; 12 – concentrate flow regulation valve; 13 – cooling water regulation valve; 14 – sampling points.*

The concentrations values of calcium and magnesium ions were determined trilonometrically. The concentratio values of hardness ions, chloride ions, and alkalinity were determined by the titrimetric method. Sulfate ion concentrations were determined using the turbidimetric method of analysis. Ammonium ion concentrations were determined using a photometric method using a KFK photoelectric photometer. The concentration of sodium ions was determined by the atomic absorption method, and the determination of the dry residue was carried out by the gravimetric method of analysis. The experimental flow diagram of the test unit is shown in fig. 1. Initial water with the amount of 50 liters was placed in the initial water tank 1, from where it was supplied by pump 2 to the membrane module 3. In the membrane module, the water was separated into filtrate (permeate) and concentrate. The concentrate was returned back to tank 1, and the permeate (purified water) was collected in the filtrate collection tank 4. As purified water accumulated in tank 4, the volume of initial water in tank 1 constantly decreased, and the concentrations of salts dissolved in the feed water constantly increased. From tanks 1 and 4, water samples were regularly taken to determine the concentrations of calcium, ammonium and other ions in them at various values of the volume of initial water in tank 1: 40, 30, 20, 10 liters. The ratio of the volume of source water entering the unit V and in tank 1 during the operation of the unit is called the coefficient of reduction in the volume of source water K. The value of K is associated with an important characteristic of membrane facilities - the recovery value, which is a ratio of the filtrate flow rate Vf to the flow rate of the source water V and the ratio: K = 1 / (1 - Vph / Vi). Table 1 presents the composition of the feed ground water and the results of determining the concentrations of calcium, ammonium, lithium, strontium in the permeates of various apparatuses at K = 1.2.

Table 1.

Ground water chemical composition and main impurities' concentrations in different membrane module permeates.

№	Indicators	source water	permeate BLN	permeate 90NE	permeate 70NE
1	2	3	4	5	6
1	Ca^{2+}, mg/L	70	0,5	4,6	10,8
2	Mg^{2+}, mg/L	15	0,1	1,0	2,4
3	HCO_3^-, mg/L	366	9,5	26,5	85
4	SO_4^{2-}, mg/L	34	1,2	2,3	5,4
5	Cl^-, mg/L	56	2,2	6,0	12,1
6	Sr^{2-}, mg/L	3,0	0,07	0,2	0,6
7	Li^+, mg/L	0,03	0,003	0,007	0,016

8	F^-, mg/L	1,6	0,03	0,14	0,53
9	NH_4^+, mg/L	7,4	0,02	0,5	1,25
10	pH	7,5	6,0	6,7	7,0
11	total salinity, mg/L	527	20,3	52,0	164,0
12	Operating pressure, bar	12,5	12,5	12,5	12,5
13	Permeate consumption, L/hr	-	48,9	71,8	100,4

Figures 5 and 6 present the results of determining the concentrations of calcium and ammonium ions in the concentrate and in the permeate of the membrane facility furnished with reverse osmosis and nanofiltration membranes with different characteristics. Figure 2 shows the graphs of the obtained dependencies of the values of calcium concentrations in the concentrate and permeate on the value of the volume reduction coefficient K.

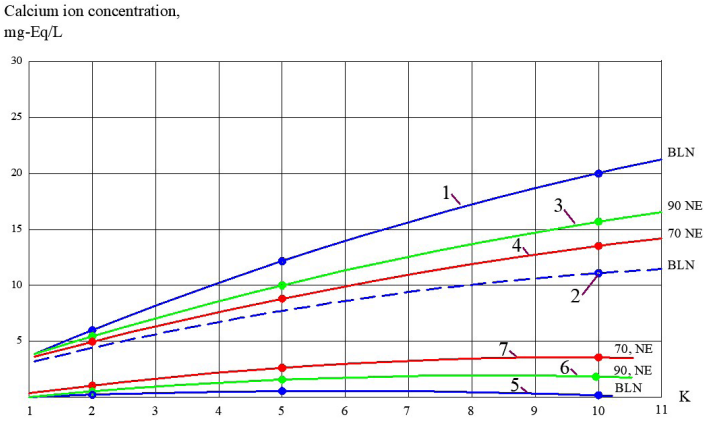


Figure 5. *Dependencies of calcium concentration values in feed water and permeate of different membrane modules on feed water volume reduction coefficient K value: 1 – concentrate, reverse osmosis BLN membranes, addition of «Aminat-K» antiscalant; 2 – concentrate, reverse osmosis membranes BLN, without antiscalant addition; 3 – concentrate, nanofiltration membranes 90 NE; 4 – concentrate, nanofiltration membranes 70NE; 5 – permeate, reverse osmosis membrane BLN, addition of «Aminat-K» antiscalant; 6 – permeate, nanofiltration membranes 90 NE; 7 – permeate, nanofiltration membranes 70NE.*

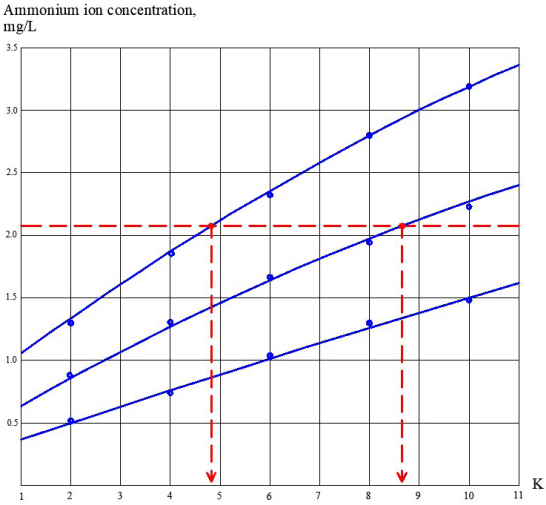


Figure 6. *Dependencies of ammonia concentrations in permeate on coefficient K value for various membrane modules: 1 – reverse osmosis membranes BLN; 2 – nanofiltration membranes 90 NE; 3 – nanofiltration membranes 70 NE.*

RESULTS AND DISCUSSION

Calcium carbonate growth rates in membrane modules with different membranes were determined in accordance with the method developed by the authors [12] that consists of obtaining of experimental dependencies of calcium concentration changes in the concentrate depending on the K value (Fig. 2). Figure 4 shows the results of determining the rates of calcium carbonate formation in membrane modules with different membranes. Since the rejection characteristics of nanofiltration membranes for calcium ions is lower than that of reverse osmosis membranes, the amount of accumulated deposits on nanofiltration membranes during the experiment turns out to be significantly less than amount accumulated on reverse osmosis membranes [12]. Therefore, when treating underground water with a high content of hardness ions, it is possible to reduce the rate of scale accumulation in membrane modules and significantly increase the recovery value expressed as initial volume reduction coefficient K due to the use of nanofiltration membranes (Fig.4).

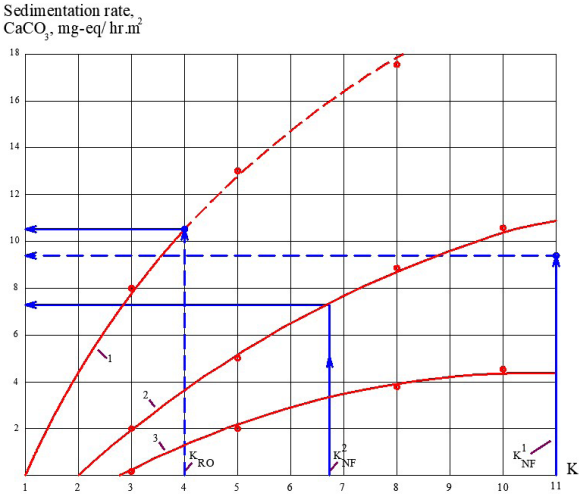
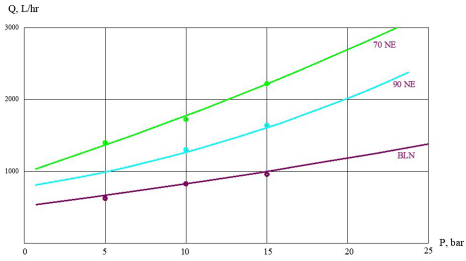
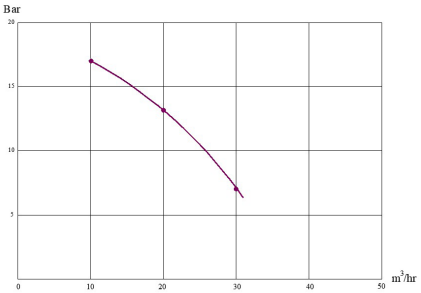


Figure 7. *Results of scaling rates determination in membrane modules with different membranes as dependencies of scaling rate values on K values: 1 – reverse osmosis BLN membranes; 2 – nanofiltration 90 NE membranes; 3 – nanofiltration 70 NE membranes.*

A lot of research experiments conducted by the authors [12–16] have indicated that the most efficient technology for treating groundwater in the Moscow region is nanofiltration technology based on the use of nanofiltration membranes. These membranes are a type of reverse osmosis membranes with reduced rejection characteristics. The required composition of purified water is achieved due to the low rejection of nanofiltration membranes for a number of contaminants, and the reduction in operating costs is achieved by reducing the consumption of reagents (inhibitors and washing solutions) due to the lower scaling rates on nanofiltration membranes than on reverse osmosis membranes (Fig. 4 and 5). Moreover, the use of nanofiltration membranes can reduce energy costs [18, 19]. Based on the experimental data obtained, the authors predicted a decrease in the productivity of the membrane installation (Fig. 6), for the cases of using various types of membranes in the purification of water of a given composition (Table 1) and the use of the Aminat-K inhibitor to prevent the formation of carbonate deposits on the membranes [15 , 16]. The results of the prediction of the decrease in the product flux of the membrane facility were carried out according to the program described in [15].



(a)



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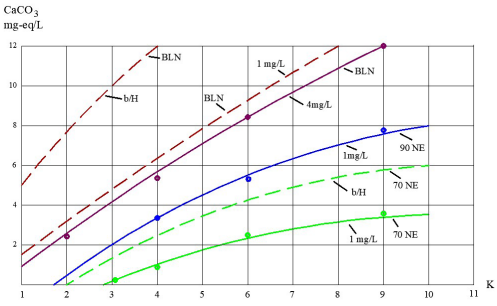

(c)

Figure 8. *Advantages of nanofiltration membranes over reverse osmosis membranes in drinking water production facilities: dependencies of product flow on pressure value (a); Q-H characteristics of the pump (b); dependencies of scaling rates on coefficient K value (c).*

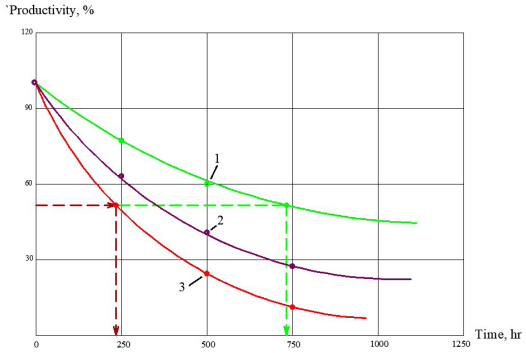

Figure 9. *Prognosis of membrane facility product flow with time for different membrane modules used: 1 – nanofiltration membranes 70 NE; 2 – nanofiltration membranes 90 NE; 3 – reverse osmosis membranes BLN.*

Figure 7 shows the flow diagram of reverse osmosis membrane elements array in the Botakovo facility with a capacity of 130 m3/h, indicating the number of membrane elements (126) and membrane housings (for 7 places) and the number of membrane stages, as well as a change in the value of K (the coefficient of reduction in the volume of source water) when the source water moves through the membrane elements installed in the pressure vessel. Table 2 shows the indicators of the composition of purified water (permeate of each membrane element) depending on the value of K at the outlet of each element in the direction of water movement through the plant buildings.

Table 2.

Product water composition changing during concentrate flow through membrane modules with different membranes (Figures 6 and 7).

Number of stage	Number of apparatus	MEMBRANES 90 NE, PRESSURE 14.5 bar							MEMBRANES 70 NE, PRESSURE 13.5 bar							
		Q_f, m^3/h	K	Ca^{2+}, mg/L	NH_4^+, mg/L	F^-, mg/L	Sr^{2-}, mg/L	Li^+, mg/L	Q_f, m^3/h	K	Ca^{2+}, mg/L	NH_4^+, mg/L	F^-, mg/L	Sr^{2-}, mg/L	Li^+, mg/L	
I	1	1,4	1,1	0,4	0,6	0,23	0,2	0,002	1,9	1,25	0,8	1,2	0,4	0,55	0,01	Purified water to the consumer, 100 m^3/h
	2	1,3	1,12	0,45	0,63	0,24	-	0,0022	1,8	1,3	0,85	1,22	0,43	-	0,011	
	3	1,2	1,15	0,5	0,65	0,25	0,22	0,024	1,8	1,8	0,9	1,27	0,46	-	0,011	
	4	1,2	1,2	0,6	0,7	0,27	-	0,027	1,7	2,0	1,0	1,3	0,48	-	0,012	
	5	1,1	1,5	0,7	0,75	0,3	0,24	0,003	1,7	2,2	1,1	1,4	0,5	0,6	0,013	
	6	1,1	2,0	1,1	0,8	0,36	0,27	0,004	1,6	2,5	1,4	1,55	0,55	0,7	0,014	
	7	1,0	2,1	1,0	1,0	0,4	0,3	0,005	1,6	3,0	1,7	1,7	0,6	0,75	0,016	
II	1	1,0	2,3	1,2	1,1	0,48	0,33	0,0055	1,5	3,8	2,0	1,8	0,65	0,78	0,016	
	2	0,9	2,5	1,4	1,1	0,51	0,34	0,006	1,5	4,2	2,5	1,9	0,7	0,8	0,017	
	3	0,8	4,1	1,6	1,2	0,55	0,35	0,0064	1,4	5,1	2,8	**2,0***	0,8	0,81	0,018	
	4	0,8	5,0	1,8	1,4	0,6	0,36	0,007	1,3	6,0	3,0	**2,2***	0,9	0,82	0,019	
	5	0,7	5,5	2,0	1,6	0,65	0,37	0,008	1,3	6,8	3,6	2,4	0,93	0,87	0,02	Permeate return to inlet of treatment plant, 21 m^3/h
	6	0,7	6,1	2,1	1,7	0,71	0,38	0,009	1,2	8,0	4,1	**2,6***	0,95	0,9	**0,022***	
	7	0,6	7,5	2,3	1,8	0,8	0,4	0,01	1,0	10,0	4,5	**3,0***	1,0	0,93	**0,025***	

* exceeds standard values

Figures 8 - 10 show the balance diagrams of the membrane array with a capacity of 65 m3/h, indicating the number of membrane modules and pressure vessels, as well as indicating the flow rates of feed water, permeate, concentrate and their mixture, as well as indicating the balance of concentrations (for example, ammonium ion) for cases: the existing scheme using reverse osmosis membranes of the BLN type (Fig. 8); modernization of the plant with the use of nanofiltration membranes 90 NE (Fig. 8); application of nanofiltration membranes 70 NE. Thanks to the use of nanofiltration membranes with the same installation scheme and with the same pumping unit and with the same number of membrane elements of the 8040 type, the concentrate discharge is reduced in the installation [20, 21], the "mixing " is avoided, the permeate production increases to the required value, and the quality of the purified water (permeate) meets the drinking water requirements according to WHO standard (Fig. 3, Tables 1 and 2). Moreover, the consumption of the inhibitor when using nanofiltration can be reduced by 4 times (up to a dose of 1 mg/l) and, accordingly, the time between washings can also be increased by 2–3 times due to the lower calcium carbonate precipitation rate on nanofiltration membranes (Fig. . 4). On fig. Figure 8 shows the results of the calculation of the Botakovo unit using reverse osmosis membranes of the BLN type with a capacity of 130 m3/h (126 membrane elements of the 8040 type), a permeate yield of 70%, and an operating pressure of 13–14 bar, i.e. with all parameters of the installation running on site. On fig. Figure 9 shows the results of calculations performed for the case of replacing membranes with model 90 NE, while the permeate yield was chosen at the level of 90%. At a recommended pressure of 12 bar, the flow rate of the pumps in each unit of the plant will be 72 m3/h, i.e. when replacing membranes, existing pumps can be used (Fig. 5). On fig. 10 shows the results of the calculation of the installation for the case of replacing reverse osmosis membranes with membranes of model 70 NE with the lowest selectivity value. At the same time, as shown in Fig. 10, the productivity of the membranes increases to a value of 100 m3/h per one membrane unit, and the permeate yield reaches 93%. However, as can be seen from Fig. 3 and Table 2, the quality of treated water in terms of ammonium concentrations exceeds the allowable standards. To achieve the required quality, it is necessary to "cut off" the tail membrane elements (the last three in the housings, as shown in Fig. 10), and direct the permeate from these elements to the inlet to the installation, mixing it with the source water. Table 2 shows the results of calculating the permeate capacity of each of the membranes and the quality of thepermeate of each membrane apparatus, on the basis of which the number of "cut-off" tail apparatuses determined.

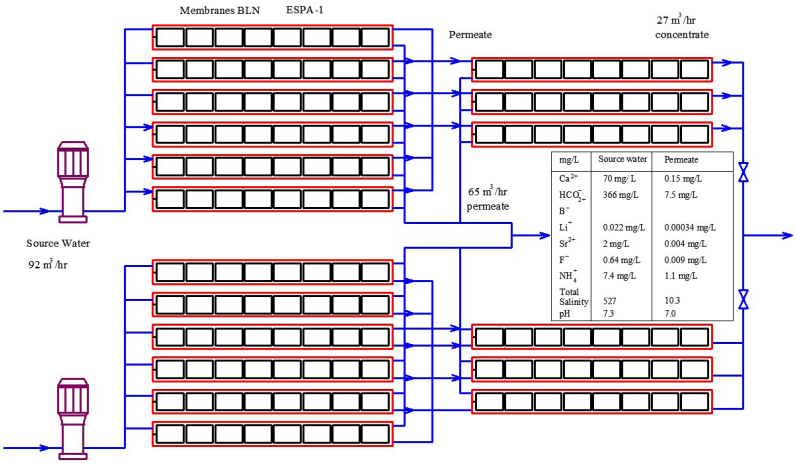

Figure 10. *A balance flow diagram of the 130 cubic meter per hour water treatment plant at the ground water intake "Botakovo" tailored with reverse osmosis BLN membranes.*

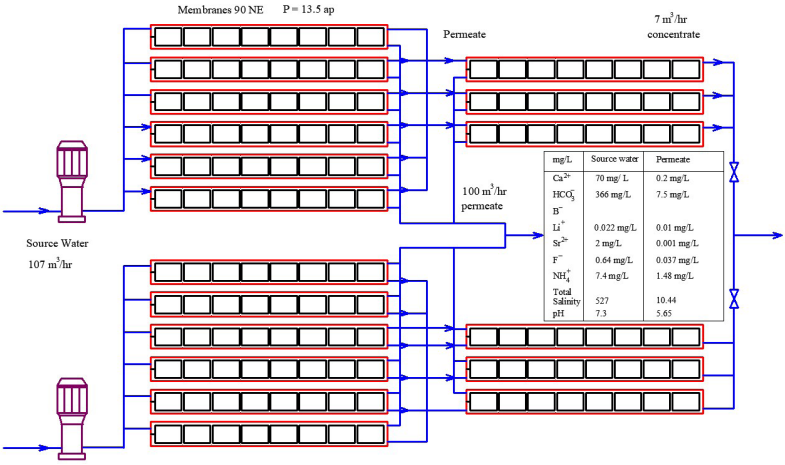

Figure 11. *A balance flow diagram of the 170 cubic meter per hour water treatment plant at "Botakovo" water intake tailored with nanofiltration 90 NE membranes.*

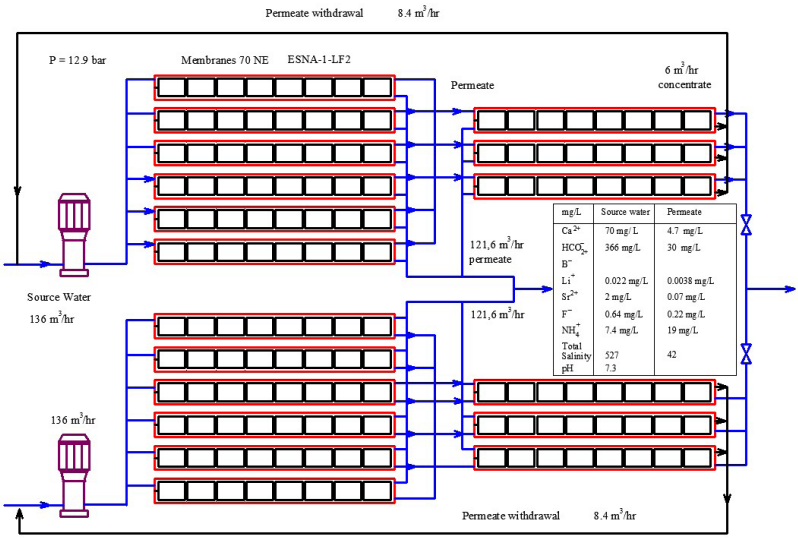

Figure 12. *A balance flow diagram of the 200 cubic meter per hour water treatment plant at "Botakovo" ground water intake tailored with nanofiltration 70 NE membranes.*

Figure 13 shows the Q-H characteristic of the pump used at the water treatment plant "Ostafyevo". As you can see, with a change in pressure from 160 to 120 m, its supply increases by 30 – 35%.

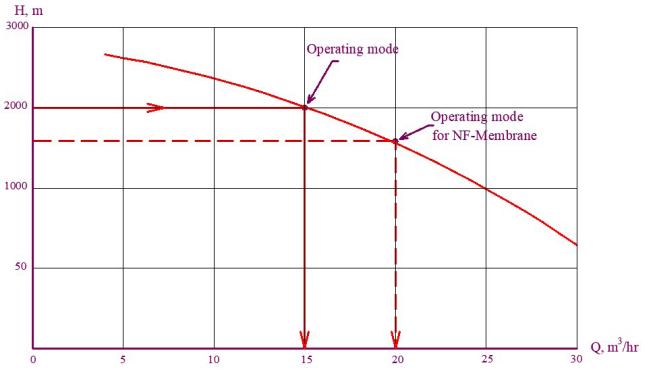

Figure 13. *Determination of the required pump water supply flow value depending on the pump's characteristics (pressure versus flow dependence).*

Determination of the working pressure of nanofiltration membranes, the number of devices for reducing the concentrate consumption ("tail" devices) is made on the basis of calculations. The selection of the flow rates of initial water, permeate and concentrate when switching to the use of nanofiltration membranes and the operating pressure of the pump is based on its Q-H characteristics, as shown in figure 14.

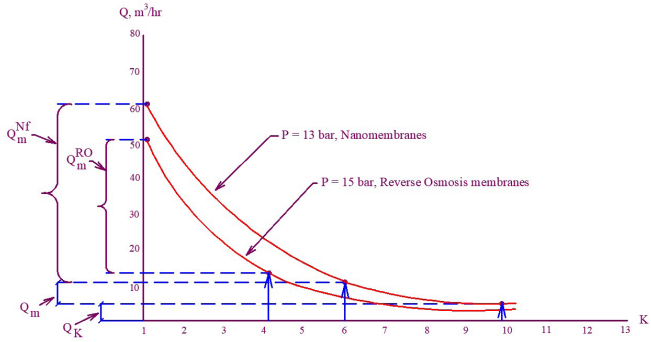

Figure 14. *The graph to determine reverse osmosis and nanofiltration membrane permeate flow Q_f, concentrate flow Q_k and "bypass" permeate flow Q_u forwarded to the membrane facility inlet.*

For the case when the installation has undergone a "modernization" in accordance with the developed and proposed recommendations for the replacement of membranes, which reduces the consumption of the inhibitor, less frequent washings are made and the consumption of detergents is reduced, the consumption of electricity is reduced, the total amount of water received increases, the results of determining the operating costs, the cost of treated water and the magnitude of the economic effect are presented in Table 3.

Table 3.

Ground water chemical composition and main impurities' concentrations in different membrane module permeates.

№	Operating parameters	Existing technology	Recommended technology
1	**2**	**3**	**4**
1	Source water consumption, m^3/h	180	224
2	permeate consumption, m^3/h m^3/h m^3/h	 130 39 000 468 000	 214 60 000 720 000

3	Concentrate consumption, m^3/h	50	10
4	Mixing consumption, m^3/h	64	–
5	Working pressure, MPa	1,3 – 1,4	1,1 – 1,15
6	Annual energy consumption, kW	456 000	456 000
7	Electricity costs, ruble	2 280 000	2 280 000
8	Membrane elements, model	HYDRANAUTICS ESPA-2	HYDRANAUTICS ESPA-2
9	Annual costs for the replacement of membranes, ruble	1 008 000	1 108 800
10	Inhibitor: type / dose	Экткоскейл / 4	Аминат / 1
11	Annual consumption of the inhibitor, kg	2 592	648
12	Inhibitor cost, ruble/t	100 000	200 000
13	Annual costs for the inhibitor, ruble	260 000	130 000
14	Number of washes per year	16	6
15	Reagent consumption per wash, kg: – NaOH (50 %) – HCl (50 %) – lemon acid	 60 60 –	 – – 250
16	Annual consumption of reagents, kg: – NaOH – HCl – lemon acid	 720 720 –	 – – 1 500
17	The cost of reagents for washing, ruble/t: – NaOH – HCl – lemon acid	 80 000 60 000 –	 – – 100 000
18	Annual costs, kg, for: – NaOH – HCl – lemon acid	 57 600 43 200 –	 – – 150 000
19	Amount of annual operating costs, ruble	2 732 000	1 794 800
20	Cleaning cost, $ruble/m^3$	2 732 000 / 468 000 = 5,84	1 794 800 / 720 000 = 2,49
21	Cost price including blending, $ruble/m^3$	2 732 000 / 698 400 = 3,91	–

Conclusions:

1. Principles to improve the operating parameters of reverse osmosis plants are discussed. The most efficient way is to replace reverse osmosis membranes with nanofiltration ones. The use of nanofiltration membranes for groundwater treat-

ment for drinking water supply can reduce the intensity of sedimentation and at the same time reduce the concentrate consumption without the risk of sedimentation.

2. The productivity of the membrane facility can be increased by 40 - 50%, while the quality of treated water remains at the level of SanPiN requirements. At the same time, the concentrate consumption can be reduced by 4-6 times.

3. Also, thanks to the use of nanofiltration membranes, it is possible to reduce the dose of the inhibitor to a value of 1 mg/l and, accordingly, reduce the operating costs by 40%.

Contribution of the authors:

Pervov A.G. - conceptualization, data gathering and processing, writing of article, scientific editing of the text.

Spitsov D.V. - methodology, scientific editing of the text, supervision, conclusion.

Htet Zaw Aung – investigation, software, formal analysis, data curation.

All authors have made an equivalent contribution to the preparation of the publication. The authors declare that there is no conflict of interests.

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DOI 10.34660/INF.2023.61.67.014

用于诊断电力运输的有前途的技术
PROMISING TECHNOLOGIES FOR DIAGNOSING ELECTRIC TRANSPORT

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注解。 本文讨论了现代技术在电力运输诊断中应用的各个方面。 理论基础，以及关键的诊断方法，都被考虑在内。 在主要部分，研究了有前途的技术，特别关注人工智能，包括神经网络的使用。 最后，总结了现代技术在诊断电动汽车方面的主要优势，以及应用前景。

关键词：电力运输、诊断、诊断创新。

Annotation. *The article discusses aspects of the application of modern technologies for diagnosing electric transport. Theoretical foundations, as well as key diagnostic methods, are considered. In the main part, promising technologies are studied, special attention is paid to artificial intelligence, including the use of neural networks. In conclusion, a conclusion was made about the key advantages of modern technologies in diagnosing electric vehicles, as well as the prospects for application.*

Keywords: *electric transport, diagnostics, diagnostic innovations.*

In the current macroeconomic conditions, one of the key trends in the global space is the rapid development of the production and operation of electric vehicles. The integration of this type of transport leads to an increase in the level of rational use of resources, increases the share of penetration of clean and environmentally friendly technologies into the socio-economic space. The key benefit of electric transport today is lower air pollution, reduced greenhouse gas and pollutant emissions, overall energy efficiency improvements, improved urban environments, and comprehensive improvements in road safety. In the most developed countries, it is electric transport that is one of the key urban carriers of passengers, which accounts for about 50% of passenger traffic [5, p. 108]. That is why the role of timely and high-quality diagnostics of the state of electric transport is increasing to determine the current state, threats and causes of failure, as well as the formation of recommendations for technical inspection and repair. Thus, a comprehensive

consideration of the issue of using the most promising technologies for diagnosing electric transport in the current conditions of digitalization and transformation of market processes in the international arena is extremely acute, which determines the relevance of the research topic.

Considering the theoretical foundations of the work, it can be noted that electric transport is a separate category of transport, for the operation of which electricity is used as the main source of energy, and a traction motor is installed in the drive [1, p. 253]. The main types of electric transport today are electric cars, trams, trolleybuses, electric trains, subways, as well as electric scooters that are gaining popularity. It should be noted that there is also a freight electric transport, which is used for the transportation of goods that require a high level of efficiency (for example, when working in quarries, freight trolleybuses are used). In turn, electric trains and electric locomotives are used for work on the railway. It should be noted that today there are two key types of electric transport:

- rechargeable (only batteries are used to store energy and require periodic recharging);
- hybrid (have both accumulators, and systems of storage and refueling of liquid fuel).

Today, despite the wide range of types of electric transport, there are certain common parameters that allow diagnostics to be carried out on the basis of a single approach, contributing to the introduction of automated tools. These options include:

- indicator of electrical insulation resistance;
- quality of electrical contact;
- active resistance of the windings;
- contact pressure.

Studying in more detail the concept and essence of transport diagnostics, it can be noted that the etymology of the word is rooted in the ancient Greek language, in which “diagnostikos” meant “capable of recognizing” [2, p. 28]. Today, the process of diagnosing includes the aspect of recognizing and evaluating the properties, features and states of transport, the essence of which comes down to a purposeful study, interpretation of the results obtained, as well as their generalization in the form of a conclusion. Diagnostics is used to assess the state of transport, timely detection of current or potential problems.

When choosing diagnostic parameters, research work, tests during operation are carried out, and reliability is also calculated. It should be noted that these works can also be carried out using modern innovative technologies, namely, on the basis of Big Data data, it is possible to obtain detailed statistical data, analyze them based on specified algorithms, build forecasts based on the identified influence factors, visualize the information received and make decisions promptly.

The fundamental basis of these studies is the consideration of operating conditions and failure patterns. With the help of probability theory, logic and mathematical statistics, a system of diagnostic parameters is selected, a diagnostic technique is determined, diagnostic tools are selected depending on the group of devices and power circuits.

Today, the following main methods for diagnosing electric transport can be distinguished, which do not require the decommissioning of the electric motor [4, p. 183]:

- vibration;
- by current consumption;
- thermal imaging;
- a method that is based on the measurement of sparking in a brush-collector device.

It should be noted that, in addition to solving problems in the field of choosing the most effective diagnostic technique, it is important to correctly select sensors for receiving information signals and converting them, as well as to determine the most convenient form of information transmission and means of processing them. It is the sensors that today can be digitized to create a single digital ecosystem that should provide the most accurate measurements, be compact (do not take up much space), have a high level of noise immunity and reliability (for example, sensors based on semiconductor elements).

One of the key tasks of both the owners of electric transport (cars) and government agencies is to ensure the safety of electric transport, one of the methods for solving this problem is the use of the most advanced and innovative diagnostic technologies, which include [3, p. 83]: artificial intelligence technologies, complex computerized systems, analysis of large volumes of statistical data, logical methods of technical diagnostics, as well as heuristic knowledge of experts, especially in narrowly focused issues.

The most promising technology today is the application of achievements in the field of artificial intelligence. Today, among the scientific community, there are three fundamental types of artificial intelligence (Fig. 1):

- ASI (Artificial Super Intelligence): surpasses the human mind;
- AGI (Artificial General Intelligence): strong artificial intelligence;
- ANI (Artificial Narrow Intelligence): is a “weak” artificial intelligence that is not able to independently make decisions and develop, obeys a person.

Figure 1. *Types of artificial intelligence that allow diagnosing electric transport in modern macroeconomic conditions*

Based on the foregoing, we emphasize that diagnostic technologies using artificial intelligence are certain computer programs that are able to effectively solve the designated range of problems and a set of tasks without an existing algorithm, only on the basis of existing knowledge and experience that were obtained as a result of solving previously existing problems. tasks. One of the advanced methods of artificial intelligence is the neural network, which teaches computers to process a set of information in a way that a person would do. This approach is a deep type of machine learning, since it includes a certain system of interconnected nodes (neurons) in a multilayer structure, which, by its type of work, resembles the processes occurring in the human brain.

In the course of diagnostics, neural networks by themselves are not able to predict the result until they pass the learning algorithm on specific examples consisting of paired information "input" - "prediction" used sequentially in the course of training and complication of the tasks facing the diagnostic system. Thus, the input data, in fact, can be represented in the form of a specific question, and the resulting prediction in the form of an answer. At the same time, as part of the diagnostics, the network requires the regulation of the weights of the values that are used when considering the data, their correctness is assessed using the specified criteria, which are the "error function".

At the beginning of the implementation of the method, it is ensured that the weight loss process is maintained, which is quite sensitive to the problem of increasing the accuracy of the neural network and the implementation of increasing the level of its abilities and increasing efficiency for subsequent improvement of

properties. Today, the use of neural networks for diagnosing the state of electronic transport is a key promising direction, since it has a number of advantages: speed, consistency, automation, flexibility, high adaptability, high accuracy.

It should be noted that within the framework of A. M. Dunaev's research, a flowchart was developed for the algorithm for the complete list of sequential checks (CLSC), and a method for optimizing the algorithmic regulatory direct enumeration method was proposed [3, p. 85]. To solve the problem of using modern technologies in diagnosing electric transport, the following stages are identified:

1. Analysis of the current equipment connection scheme, which is the object of study;
2. Definition of the block of the first diagnostic check;
3. Construction of blocks and their numbering for compiling branches of the algorithmic tree;
4. Formation of a complete list of sequential checks (CLSC);
5. Determination of sequences within the algorithm that will satisfy the established optimality criterion;
6. Synthesis of the constructed tree of the algorithm from the found components.

The proposed algorithm is considered for the diagnostics of industrial frequency converters, integration for diagnostics, which can be carried out using the developed domestic application "FC_OPTIM", the structure of which is shown in Fig. 2.

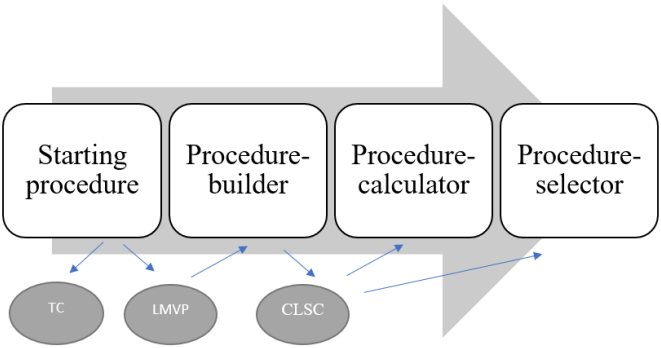

Figure 2. *The structure of the application for obtaining the optimal algorithm (OA) for diagnosing the inverter*

Legend:
TC - table of characteristics;
OA is the optimal algorithm for diagnosing industrial FC.

Considering the proposed algorithm in more detail, it can be noted that the starting procedure is aimed at ensuring the effective preparation of the application form for work and the execution of the first stage. With the help of the implementation of the builder procedure, steps 2, 3 and 4 are performed. In turn, the calculation procedure and the selector procedure imply the implementation of stage 5 within the framework of the considered methodology. In conclusion, we note that in practice, a separate separation of the procedure is not required for the execution of the 6th stage.

Based on the results of the study, a modern method of the most optimal logical algorithm was obtained for diagnosing industrial frequency converters, which are part of frequency-controlled electric drives. It is also important to note that the advantage of this study is the reliance on the heuristic knowledge of Russian experts in the field of diagnostics of complex electrical equipment, building a structural knowledge base and an expert system for diagnosing industrial frequency converters. The practice of implementing the algorithm and the proposed expert system confirms the effectiveness of its functioning. It should be noted that the study of Dunaev A. M. is possible to finalize and integrate the algorithm on the basis of artificial intelligence for the subsequent training and development of this system.

Another promising direction in diagnostic technology is the use of visual damage segmentation. The basis of this system is to obtain a dataset in the format of images of electric vehicles with damage (for starters, about 250,000 images of various types of damage on transport are required) [5, p. 967]. Further, with the help of markers (similar to cars), it is necessary to manually mark the first 1-2 thousand images with damage and with whole parts, and then, using neural network training, it is possible to perform rough markup to speed up the process. Then specialists can manually correct this markup. The integration of neural systems into the process of creating a diagnostic system will reduce the time spent by specialists by 36%.

As a result, it is possible to obtain a labeled dataset of several thousand images, which will make it possible to generate synthetic labeled images that require minimal manual adjustment using the retraining of a generative adversarial network (GAN), the formation of filtering by combining neural networks. The operation of the simplest neural network is shown in Figure 3. At the input X, the signal is transmitted to the neuron, and then, depending on the value of the set, the signals are processed and transformed using the mathematical function F.

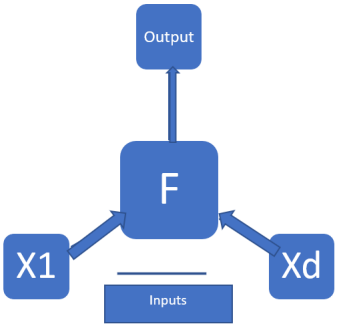

Figure 3. *The operation of the simplest neural model in diagnosing electric transport*

As part of this process, it is important to periodically check and monitor the results of neural networks, as well as promptly make adjustments if necessary. The involvement of neural networks will make it possible to form a single system that reflects the results of diagnosing eclectic transport using a dataset created on the basis of combining real and artificial created images of transport that are of equal value today from a technological point of view and the development of new diagnostic technologies. This solution can be used both for segmentation and for building a diagram (visualization) of damage during primary diagnosis using only photographs of electric vehicles. The process of processing photo and video images is shown in Figure 4.

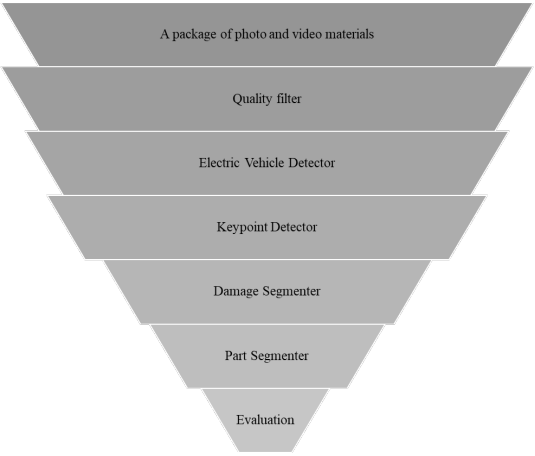

Figure 4. *Stages of information processing by neural networks using visual segmentation of damage to electric transport in its diagnosis*

Also, on the basis of this system, in the future it is possible to carry out preliminary data processing, assess the degree of damage, potential breakdowns (marking their zones in red). An additional interface is the ability to record a circular video of electric vehicles in order to carry out complex digital diagnostics by specialists in real time, including remotely. With the help of this technology, special attention is paid to segmentation in the course of diagnosing electric vehicles; to solve this problem, several types of deep learning neural networks have already been tested, namely: two-stage detectors Mask R-CNN and Faster R-CNN and one-stage YOLO families with various metrics and values parameters.

Based on the results of the work, a text description of the results of electric transport diagnostics is formed, it is possible to establish primary damage and those that were received during transportation, as well as quickly visualize damage, understanding the degree of damage to parts, potential risks and threats to the mechanism of electric transport operation, predict the degree of wear and the possibility of further operation .

Considering the prospects of this diagnostic technology, it can be noted that it can be adapted for mobile devices, as well as integrated into the IT system of companies that carry out diagnostics, as well as owners of electric vehicles to ensure diagnostic transparency. Already today, to obtain processed information using this diagnostic system, the time costs do not exceed 10 minutes, which, with an increase in the number, will allow the user to speed up the learning process of the neural network and the correctness of its results and conclusions during the assessment. According to experts, the accuracy of damage classification during diagnostics is 87%, which is one of the highest rates achieved in the field of remote diagnostics of electric vehicles.

In the future, this innovative solution can be improved and expanded: a module for calculating damage assessment, repair costs, and a general assessment of the state of electric transport has been added. This system can grow into an entire ecosystem that provides a convenient and simple service to increase the transparency and speed of diagnosing electric vehicles both in Russia and around the world, which is extremely relevant in the context of growing users of electric transport and supporters of “green energy” to improve the environmental situations.

Thus, we can conclude that today the development of passenger transport and an increase in the level of transport services is currently a guarantee of improving the conditions and living standards of the population, as well as ensuring the safety of citizens. The faster the spread of electric transport, the faster it will be possible to reduce the number of harmful emissions from internal combustion engines. This is the inevitable and only possible path that the metropolitan cities of Europe and Asia are already following. Electric buses, electric cars, electric bicycles and electric scooters have an impact on improving the environmental situation. Al-

ready today, the Governments of the regions are actively replacing diesel buses and will continue to use electric buses and building infrastructure for electric vehicles and two-wheeled vehicles.

Modern technologies for diagnosing electric vehicles are able to solve the most complex problems, as well as predict possible risks and threats during operation, which allows you to quickly fix problems, as well as achieve the most efficient use of electric vehicles. In the future, further rapid development of integration and an increase in the level of penetration of artificial intelligence in the field of electric transport diagnostics are expected.

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DOI 10.34660/INF.2023.99.98.015

牵引电气设备的数学建模。 单相全波整流器的研究
MATHEMATICAL MODELING OF TRACTION ELECTRICAL EQUIPMENT. STUDY OF SINGLE-PHASE FULL-WAVE RECTIFIER

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抽象的。 文章简要分析了地面型缺相自动穿越的原理，探讨了不同列车组下机车缺相穿越的过程，通过应用试验探讨了不同列车组下缺相自动穿越的差异，验证了地面型缺相自动通过更适用于不同的列车组。

关键词：电力机车，电气部件。

Abstract. *The article briefly analyzes the principles of automatic passing of ground-type phase failure, discusses the processes of passing of phase-loss by locomotives under different train sets, investigates the differences of automatic passing of phase-break under different train sets through application tests, verified that automatic passing of ground-type phase failure is better applicable to different train sets.*

Keywords: *Electric locomotives, Electrical parts.*

Introduction

Electric locomotives produced in different countries have a complex voltage system that is inconvenient for intermodal international rail transport. Several standard voltages for electric locomotives have been established internationally. The DC voltage is 600 volts (not preferred), 750 volts, 1500 volts and 3000 volts. AC 6250V, single phase (not recommended), 50Hz or 60Hz, 15000V, Hz, 25000V, 50Hz or 60Hz, etc.

An electric locomotive consists of three parts: a mechanical part, an electrical part, and an air duct system.

1.Mechanical part

Including running gear and car body. The undercarriage is the part that perceives its own weight and the load of the vehicle and moves along rails, consisting of a 2- or 3-axle bogie and a spring suspension device installed on it, a foundation braking device, a wheel pair and an axle box, a gearbox and a traction motor. suspension devices. body

It is used to accommodate various equipment, and is also a workplace for flight attendants, it consists of a base, a driver's cabin, a platform, a side wall and a roof. The driver's cab is located at both ends of the car body and is connected by a corridor. Install control equipment in cab, such as driver controller, brake valve, push button switch, monitor.

Tables and lamps, etc. Two cabins are used to install all the main equipment of the locomotive, sometimes divided into small rooms, and auxiliary units, switchgear, converters and traction transformers are installed accordingly. Some electrical equipment such as pantographs, main switches and lightning arresters are installed on the roof. clutch

The buffer device is installed at two ends of the towing beam of the subframe of the car body. The weight of the body and equipment is transferred to the bogie through the body support device, and the body support device also plays the role of transmitting traction and braking force.

2. Electrical parts

Various electrical equipment on the locomotive and its connecting wires. Including main circuit, auxiliary circuit, control circuit and their protection system.

1. Main circuit: the most important part of an electric locomotive. It defines the main characteristics of the locomotive, consisting of a traction motor and electrical equipment connected to it, and consists of wires. The entire traction load current flows in the main circuit, and its voltage is the operating voltage of the traction motor, or the mains voltage of the contact network, so the main circuit is a high-voltage and high-current power circuit on an electric locomotive. . It converts the electrical energy of the contact network into traction required to propel the train.

Driving force.

2. Auxiliary circuit: Electric circuit that supplies various auxiliary motors of electric locomotive. The auxiliary motor drives various auxiliary mechanical equipment, such as fans to cool traction motors and braking resistors, compressors to supply compressed air required for various pneumatic equipment, etc. Auxiliary motors can be DC, can also be asynchronous.
3. Control circuit: low voltage low power circuit, consisting of drive controller, drive coil and interlock contacts of control electrical appliances. The function of the control circuit is to ensure that various electrical appliances

in the main and auxiliary circuits of the locomotive work according to a certain program. Thus, the motor of the car can move according to the intentions of the driver.

4. Protection system: means to ensure the above-mentioned various circuits.

Air duct system

According to its purpose, it can be divided into:

1. Pneumatic brake pneumatic system that supplies compressed air needed to brake locomotives and vehicles.
2. A control air circuit system that supplies the compressed air required for the electrical equipment of the locomotive.
3. Auxiliary air system to supply compressed air needed for auxiliary devices such as locomotive sand spreader, windsock and windshield wiper. Function: It is a wind pressure channel, providing a wind source for locomotive pantograph lifting, locomotive braking, and locomotive heat dissipation. Classification By purpose, electric locomotives can be divided into two types: industrial and mine electric locomotives and main electric locomotives. Industrial and mining electric locomotives mainly use the DC system, and their power and speed are generally lower than those of mainline electric locomotives. They are generally classified according to the weight of the locomotive, such as 150 tons, 100 tons, 85 tons, 70 tons, 60 tons,

50-ton and lighter grades. Larger tonnage locomotives are used on standard gauge lines, while lighter locomotives are mainly used on various narrow-gauge lines. Mainline electric locomotives can be divided into passenger electric locomotives, freight electric locomotives, passenger and freight electric locomotives, and shunting electric locomotives by purpose.

Classified according to the existing system adopted by electrified railways, mainline electric locomotives can be divided into two categories.

The electric locomotive receives electricity from the contact network, and the current supplied by the contact network to the electric locomotive has two types of direct current and alternating current. Due to the different current systems, the electric locomotives used are also different, which are divided into three categories: DC electric locomotives, AC electric locomotives, and AC DC electric locomotives.

The electrified railway contact network of my country uses segment switching of the power supply. In order to avoid a short circuit between the two arms of the power supply and maintain a stable connection, the pantograph-chain connection, at the end of each arm of the power supply and to the output of the traction substation, the sleeves are galvanically isolated [1]. The design of the electrical phase separation device is divided into two types: the first uses a specially designed

and manufactured insulating phase separation device, suspended on the contact network for insulation; the second uses an air gap between the connecting wires of the insulating anchor. section for isolation. The phase dividing insulator is heavy, and the pantograph contact suspension is seriously worn out, therefore it is suitable only for low-speed electrified railways [2]. The hinged electrical split phase of the anchor section overcomes the hard point problem associated with the electrical split phase of the device, and has the advantages of no hard point, smooth transition, and little impact on the pantograph and contact network, gradually replacing the split phase insulator [3]. Commonly used electric locomotive phase separation methods include manual phase separation at power off, automatic phase separation on board, and automatic phase separation on the ground, and automatic phase separation on the ground includes various forms [4].

Heavy-duty rail transportation has gained wide recognition on the railways of different countries due to its large capacity, high efficiency and low transportation cost [5]. Over the past 20 years, China's heavy-duty railways have greatly improved both in terms of traction quality and line scale, and have made great contributions to ensuring the transportation of national key materials. In order to further reduce the loss of speed of electric locomotives during the passage of electrophase separation, increase the capacity of heavy-duty railways and increase economic benefits, it is especially necessary to apply ground-based automatic phase separation technology on electrified heavy-duty railways. [6]. This article briefly analyzes the principle of ground-based automatic phase separation, focuses on discussing and researching the locomotive phase separation process under various locomotive sorting methods, and presents the relevant actual test results.

The purpose of the work: The study of a single-phase full-wave rectifier when operating on an active-inductive load with a reverse diode.

Initial data:

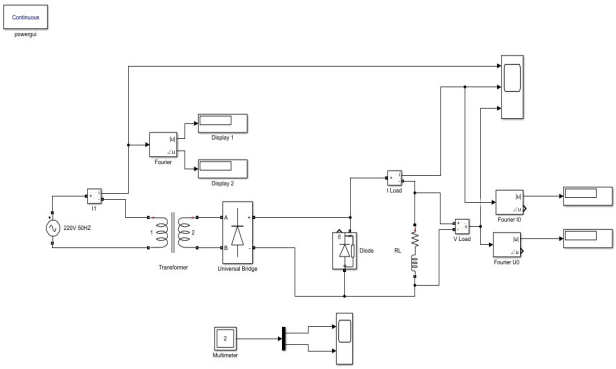

Figure 1. *Calculation model of a single-phase bridge-controlled rectifier*

2. Basic calculation expressions.

$$S_1(1) = \frac{U_{1max} I_{(1)max}}{2}, \text{ВА};$$

$$S_1(1) = \frac{220 * 2.57}{2} = 282.7$$

$$S_1(1) = \frac{220 * 1.52}{2} = 167.2$$

$$P_1(1) = S_1(1) \cos \varphi,$$

$$P_1(1) = 282.7 * 0.903 = 255$$

$$P_н = U_н I_н, \text{Вт}.$$

$$p_н = 4{,}42 * 44{,}21 = 19{,}40$$

3. Calculation results.

Table 1.

Experience in building an external characteristic.

Data				Measurements							Calculation		
U_{1max}, В	f_1, Гц	$L_н$, Гн	$R_н$, Ом	$I_н$, А	$U_н$, В	I_1 (1) МА, А	X φ, Гр ад	COS Ф	U_{VDMAX}, В	I_{VDMAX}, А	S1 (1), ВА	P1(1), Вт	$P_н$, Вт
220	50	0.6	10	4.42	44.21	2.57	-25.39	0.903	-89.9	4.5	282.7	255.394	195.408
		1.2	20	2.55	51.05	1.52	-20.52	0.937	-93.5	2.5	167.2	156.591	130.178
		1.8	30	1.8	53.97	1.09	-18.12	0.950	-95	1.75	119.9	113.954	97.146
		2.4	40	1.39	55.59	0.85	-16.74	0.958	-95.6	1.35	93.5	89.538	77.270
		3	50	1.13	56.64	0.71	-15.87	0.962	-96	1.1	78.1	75.123	64.003
		3.6	60	0.96	57.37	0.6	-15.3	0.965	-96.5	1	66	63.661	55.075
		4.2	70	0.83	57.89	0.53	-14.94	0.966	-97	0.8	58.3	56.329	48.049
		4.8	80	0.73	58.31	0.47	-14.72	0.967	-97	0.7	51.7	50.003	42.566
		5.4	90	0.65	58.63	0.43	-14.6	0.968	-97.5	0.6	47.3	45.773	38.110
		6	100	0.59	58.89	0.4	-14.55	0.968	-97.6	0.55	44	42.589	34.745

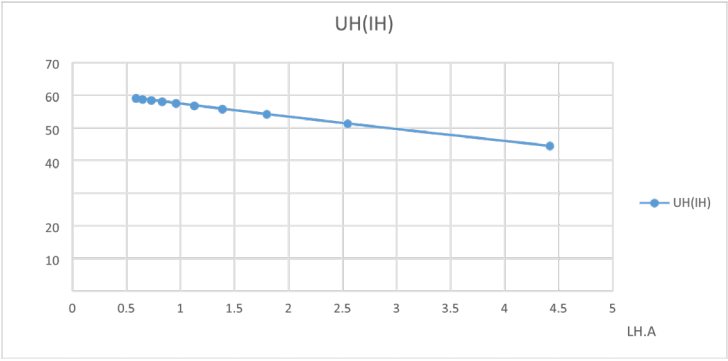

Figure 2. *External characteristic*

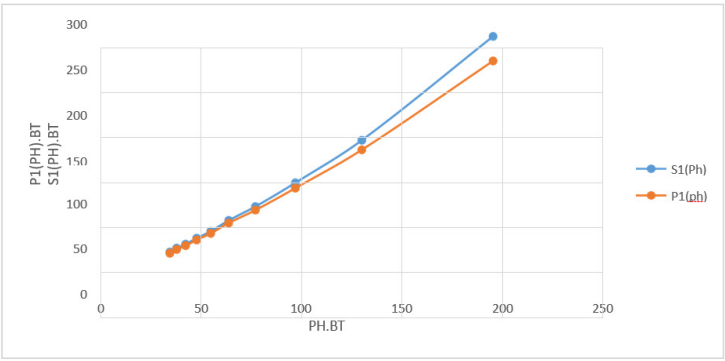

Figure 3. *Energy characteristic.*

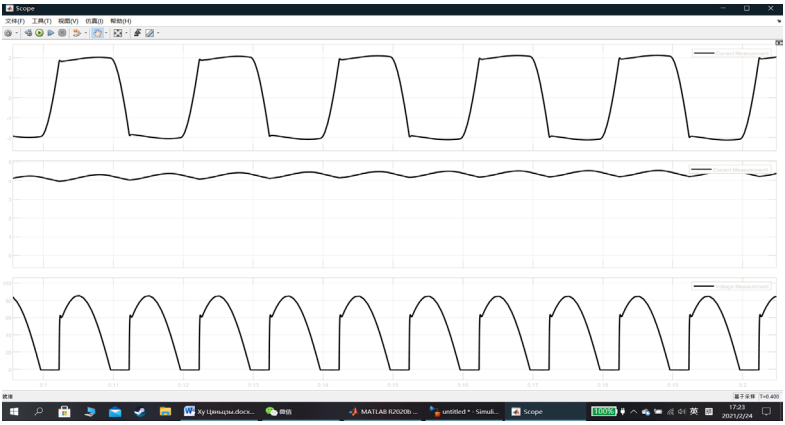

Figure 4. *Oscillograms of supply current, load and load voltage*

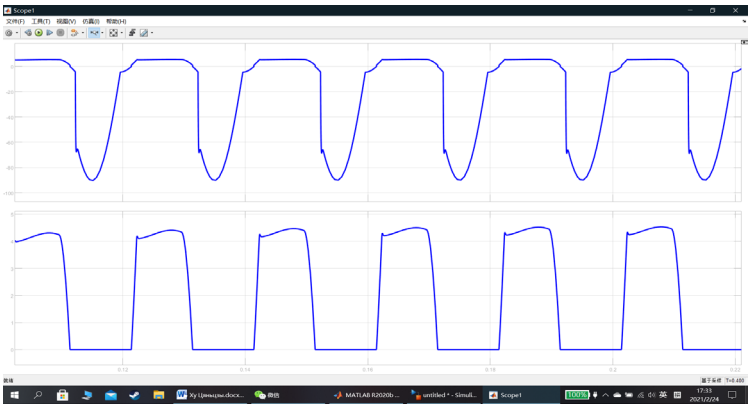

Figure 5. *Voltage and current waveforms of the bridge diode Conclusion: Researched and simulated single-phase Unmanaged rectifier. Received load characteristics and energy characteristics.*

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DOI 10.34660/INF.2023.26.79.016

过电压对电力机车高压电气设备的影响
INFLUENCE OF OVERVOLTAGE ON HIGH-VOLTAGE ELECTRICAL EQUIPMENT OF AN ELECTRIC LOCOMOTIVE

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抽象的。 本文结合我国电气设备现状，介绍了电力机车过电压的类型，分析了电气设备发生故障的原因。 给出了一些降低过电压水平的措施和提示。
关键词：电力机车，过电压，绝缘匹配，绝缘水平，电气设备。
Abstract. *This article introduces the type of electric locomotive overvoltage and analyzes the reason for the failure of electrical equipment, combined with the current state of electrical equipment in our country. Some measures and tips are given to reduce the level of overvoltage.*
Keywords: *electric locomotive, overvoltage, insulation matching, insulation level, electrical equipment.*

INTRODUCTION

With the rapid development of railway construction in my country in recent years, rail transport plays an increasingly important role in the national economy, especially high-speed electric trains, heavy-duty electric locomotives, electric traction equipment such as subway light rail and intercity trains, etc. It is closely related with the production and life of people. At the same time, the requirements and expectations of people for railway operations are becoming higher and higher. Therefore, high efficiency, safety and speed have become the most important requirements for the development of electric rail transport. equipment.

Using the example of an outdoor electric locomotive with a single-phase 25 kV AC power supply, the high-voltage electrical equipment on the roof is not only subject to erosion from various aggressive environments for a long time, but also withstands various loads. types of surges. According to statistics, during the operation of electric locomotives, especially in climatic conditions of sleet, snow,

fog and heavy pollution, there are many accidents on roof equipment, including accidents on the floor and burnout of electrical equipment on the roof. for the vast majority This phenomenon has become one of the main bottlenecks limiting the normal operation of electric locomotives. The reason for the collapse of the roof, in addition to external causes caused by adverse environmental conditions, is mainly various kinds of overvoltages. The design of the high-voltage insulation of an electric locomotive involves the high-voltage electrical equipment of the electric locomotive, as well as the power supply systems of the contact network and the ground substation, which are closely related to it, therefore, when designing the network circuit of the diesel locomotive, focus only on the electric locomotive. The equipment parameters are insufficient, but the power supply system and the electric locomotive should be considered as a single whole. Since the power supply system and the on-board system in our country belong to different systems, and the standards used in their respective designs are different, insulation matching imbalance is inevitable; the design of insulation of high-voltage electrical equipment of an electric locomotive can also formulate targeted measures to solve the problem of collapse of the roof of an electric locomotive.

1. Electric locomotive overvoltage classification

The electric locomotive is powered by a single-phase AC contact network with a rated voltage of 25 kV. According to the GB1402-1998 standard, a rail traction device with a rated voltage of 25 kV in a railway electric traction system includes electric locomotives, electric trains, or long-distance railway electric locomotives. locomotives. The allowable voltage is 27.5 kV (rms value), and the minimum allowable voltage is 19 kV (rms value). In the electrified section of heavy-duty electric traction, the voltage range will exceed this range. the traction power supply network will not be too low when several electric locomotives are operating on the site, often the pressure setting in the network will be higher than the standard value.

The main types of overvoltages that form electric locomotives during operation are as follows.

2.Overvoltage due to rephasing

The main reason for the occurrence of overvoltage that occurs when the electric locomotive moves through the joint electrical phase separation of the anchor section is: when the locomotive enters the non-electric zone of the over-split phase, the capacitance of the current collector with respect to earth, the high-voltage lead wire on the roof and the neutral built-in wire, and the high-voltage voltage transformer form a resonant circuit. Since there will be an induced voltage in the phase-splitting non-electric region, the transient circuit change structure from “electricity” to “no electricity” or from “no electricity” to “electricity”. A high-order oscillatory circuit is formed, which generates an oscillatory overvoltage. The

reason for this has nothing to do with the normal operation of the driver to turn off the main switch when rephasing the locomotive, but has something to do with the electrical equipment of the locomotive and the parameter structure of the articulated phase separator. Different sections of the line and different electric locomotives have different amplitude of overvoltage caused by phase splitting. According to the line tests carried out by the relevant departments, the maximum amplitude of overvoltage caused by phase splitting is close to 100 kV. and in severe cases, they even cause a fire in the contact network and a breakdown of the insulator.

3. Overvoltage caused by the connection of the pantograph-contact network

Since the electric locomotive is powered by the dynamic contact between the pantograph and the catenary, and the suspension system of the pantograph and the catenary has a certain degree of elasticity, the hinge clamp, positioning clamp, or dynamic contact of the rigid point of the pantograph arc or poor line condition and low contact pressure of the pantograph may lead to to frequent shutdown of the pantograph. Inductive loads such as voltage transformer windings and transformer primary windings on a locomotive form a resonant circuit during the frequent off-line pantograph transients, resulting in high-order resonant overvoltage; function to form ferromagnetic oscillations. As a rule, the overvoltage amplitude in this case will not be too large, but in severe cases it will cause not only sparking and burning of the pantograph sliding plate and contact network, but also easily cause a fire in the high-voltage voltage transformer.

4.Operating overvoltage

The operating overvoltage of an electric locomotive can be of two kinds inside and outside the electric locomotive. Reconnection of the traction power supply system or an overvoltage generated by an adjacent electric locomotive on the same section will cause the machine to overvoltage. the operating overvoltage amplitude inside the locomotive is related to the parameters of the primary side circuit of the locomotive. Operating overvoltage is more detrimental to the insulation of vacuum circuit breakers and traction transformer windings, and in severe cases can cause explosive damage to vacuum circuit breakers.

5.Atmospheric overvoltage

Climate-induced atmospheric overvoltage acts on the 25kV contact network, which is mainly divided into direct lightning overvoltage and induced overvoltage. Direct lightning surge is an overvoltage created by a lightning discharge directly affecting the contact network, and its wavelength is relatively short; induced overvoltage is an induced overvoltage that occurs when a lightning discharge occurs near a catenary and the wavelength is relatively long.

Electric locomotives are subject to so many types of overvoltages, in extreme cases the simultaneous occurrence of overvoltages can cause the possibility of

overvoltage superimposition, so the overvoltage environment that electric locomotives are exposed to during operation is relatively harsh. Overvoltage is more harmful to high-voltage electrical equipment installed on the vehicle. As a rule, the high-voltage electrical equipment of a single-phase AC electric locomotive is divided into protective equipment and functional equipment. onboard electric locomotive system; functional equipment mainly includes post insulators, pantograph, main switch, high voltage disconnector, pressure transformer, current transformer, high voltage cable and traction transformer, etc. The insulation strength of functional equipment mainly depends on the external insulation characteristics of the equipment, while to Equipment such as vacuum circuit breakers, high voltage voltage transformers and transformers also have ground insulation requirements due to their internal design, and their insulation strength depends on the insulation materials used inside the equipment.

6. Coordination of electric locomotive insulation

The purpose of insulation matching is to correctly resolve the conflict between overvoltage and insulation, determine the insulation level of the equipment and ensure efficient, safe and reliable operation of electric locomotives. The current insulation matching mode is based on the protection characteristics of the surge arrester, and the insulation level of the protected equipment is selected by multiplying on this basis the appropriate matching factor.

The level of protection of the insulation of the onboard equipment of electric locomotives depends on the support insulators and the materials of the external insulation of the equipment. In the early stage of the introduction and absorption of imported locomotive technology, foreign locomotives mainly adopted the OV3 overvoltage level of the IEC 60077-1 standard, and the related roof equipment and protection equipment had a low insulation level that could not adapt to the relatively harsh environment. home climate. For example, the structural height of the outer insulation and support insulators of the pantograph of vacuum circuit breakers and high-voltage disconnectors introduced at an early stage does not exceed 315mm, and the phenomenon of breakdown of the outer insulation of roofing equipment often occurs. in the operation of electric locomotives. Considering the current severe climate situation in China, the insulators or insulating shells of electrical equipment on the roof of most electric locomotives generally use silicone rubber composite materials with high waterproof performance, good weather resistance at low temperatures. TB/T 3077.2 requires the classification “Composite insulators for electric locomotive roofs, part 2” in 2006 is usually selected. The standard lightning impulse withstand voltage (peak value) is not less than 185 kV. voltage at 10kA rated operating surge current of the arrester is generally 105-110kV, so the insulation coordination coefficient Kc of electrical equipment is greater than 1.6, in line with Chinese standards $Cs \geqslant 1.4$

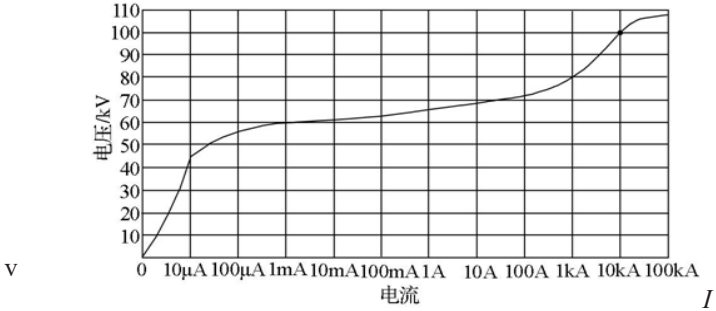

Figure 1. *Volt-ampere characteristic of the arrester*

The insulation level of high-voltage electrical equipment can be intuitively displayed using the volt-second characteristic curve. The volt-second characteristic refers to the relationship between the shock wave voltage and the voltage duration when the insulation breaks down under the action of the shock wave voltage or operating wave. Typically, the insulation volt-second characteristic of equipment can be obtained by breaking down the insulation at various shock wave voltages, as shown in Figure 2. As a protective device, the insulation volt-second characteristic of the arrester should be below the protected high voltage. surge suppression and protection of functional equipment.

Figure 2. *Coordination of insulation based on arrester protection*

According to the overvoltage protection mode based on the protection characteristics of the arresters as the basis of insulation coordination, the main purpose

of the insulation coordination of the high-voltage electric locomotive system is to select the appropriate parameters of the arrester to avoid the insulation breakdown of the protected equipment under the influence of overvoltage shock waves. However, in the actual operation of electric locomotives, due to harsh climatic conditions and uncertainty caused by overvoltage, the residual voltage of the arrester after its operation under the action of the shock wave voltage may still exceed the insulation level of the protected equipment, and protected equipment will also appear breakage phenomenon.

7.Measures and proposals

Based on the analysis of practical examples of coordinating the isolation of network circuits of electric locomotives in the country and abroad, the use of two-stage discharge protection is an effective solution. From the analysis of Fig. 3, it is easy to see that after the operation of the first-level surge arrester with an overvoltage shock wave, the second-level surge arrester can effectively suppress the residual voltage generated by the first-level surge arrester, so as to avoid damage to the protected equipment after the arrester trips.

Figure 3. *Isolation coordination based on two-stage arrester protection*

For example, the side circuit of the Bombardier Iore-Kiruna electric locomotive is protected by a two-stage arrester, which is a relatively good example. A surge suppressor is installed at the output of the circuit breaker. The arrester at the end of the pantograph is 120 kV at a rated discharge current of 5 kA, and the value of the residual voltage at the output of the vacuum circuit breaker is 108 kV at a rated discharge current of 5 kA. The protection of the two-stage arrester can effectively suppress various types of overvoltage, especially for the operating overvoltage generated on the side of the vacuum circuit breaker, which has a significant inhibitory effect, so as to effectively achieve the purpose of high voltage

protection. electrical equipment. From the statistics of failures of vacuum circuit breakers used on electric locomotives, the number of failures of burnt vacuum circuit breakers on electric locomotives without two-stage discharge protection is much higher than that of locomotives protected by two-stage arresters. Due to different models of electric locomotives, the parameters of the electrical equipment of the side circuit of the network, the parameters of the transformer windings and distributed capacitance will be different, and there will also be different operating overvoltages. At present, due to the lack of test data for a high-voltage system on the roof of an electric locomotive, it is difficult to reduce the operating overvoltage by reasonable selection of the parameters of high-voltage electrical equipment, but a two-stage arrester protection mode in the side circuit of an electric locomotive can be used to effectively minimize the overvoltage magnitude on the roof.

Conclusion

By analyzing the cause of the overvoltage of the electric locomotive, it can be seen that the high-voltage electrical equipment of the mains voltage encounters a complex overvoltage situation during the operation of the electric locomotive and equipment insulation failure. failure under the influence of external factors of severe weather conditions. This phenomenon caused great harm to the safety of the movement of electric locomotives. Therefore, when designing the side circuit of the electric locomotive network, the problem of electrical equipment insulation coordination should be addressed systematically, and at the same time, reasonable lightning protection parameters and configuration modes should be selected to effectively suppress overvoltage, thereby reducing the exposure of high-voltage electrical equipment to hazards to ensure the safety of electric locomotive traffic.

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DOI 10.34660/INF.2023.18.75.017

疗养院森林植物检疫状况评估
THE ASSESSMENT OF THE PHYTOSANITARY CONDITION OF THE SANATORIUMS' FORESTS

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抽象的。 这篇文章涉及度假森林，描述了雅罗斯拉夫尔地区的 Yasnye Zori 疗养院，检查了人工林的病虫害。 根据疗养院森林公园区种植调查结果，可以说大部分木本植物卫生状况良好，令人满意，但树木受损、枯死、腐烂、病虫害较多。还注意到种植园。 提出了采取措施改善绿地总体状况和居民安全娱乐的建议。

关键词：旅游胜地森林，植物检疫条件，疾病，害虫。

Abstract. *The article deals with resort forests, characterizes the Yasnye Zori sanatorium in the Yaroslavl region, examines diseases and pests of tree plantations. According to the results of the study of plantings in the forest park zone of the sanatorium, it can be said that most of the woody plants are in good and satisfactory sanitary condition, however, damage, drying out, rot, diseases and pests of tree plantations are also noted. Recommendations are given for taking measures to improve the general condition of green spaces and for the safe recreation of the population.*

Keywords: *resort forests, phytosanitary condition, diseases, pests.*

Resort forests are forest areas located on the territory of the districts of sanitary protection of resorts. They belong to the forests of the 1st group. The main purpose of resort forests is to protect the natural healing resources of resorts (landscape, climatic, water) from pollution and premature exhaustion, as well as to create favorable conditions for the treatment and recreation of people [1].

The park of the sanatorium complex (sanatorium) is intended for landscape therapy, i.e. it forms an environment that provides optimal conditions for organizing the treatment process and aesthetic comfort of the specific contingent of this sanatorium.

The following approximate rate of forested area per place of the resort in forest-sufficient areas has been established: for mud and balneological resorts - 0.15 ha, for climate-mud, balneological and balneo-climatic resorts - 0.25 ha, for climatic ones - 0.30 ha. Thus, a sufficient number of green spaces in forest park areas is a necessary condition for the full functioning of resorts and sanatoriums. The good condition of green spaces in these areas also contributes to the aesthetically attractive and safe recreation of the population.

The state of green spaces in the sanatorium-resort forests is of great importance in preserving and improving the conditions for the population in this territory.

The purpose of the study is to assess the phytosanitary state of the resort forests of the sanatorium “Yasnye Zori” in the Yaroslavl region.

Goals:

- To determine the species composition of trees in the forest park zone of the sanatorium of the Yaroslavl Oblast.

- To conduct an analysis of the phytosanitary state of tree plantations in sanatorium-resort forests.

The object of the study is the tree plantations of the sanatorium “Yasnye Zori” in the Yaroslavl region.

When conducting the study, GOST 2140-81 [2] was used, which includes visible defects found in tree species. The handbook [3] was also used to determine the phytosanitary state. In the forest park zone of the sanatorium, a visual assessment was carried out, which included the fixation of such parameters as: tree names, visible malformations, the presence of dead wood, damage, diseases and pests, as well as the general sanitary condition of the plantations.

Sanatorium “Yasnye Zori” is located in the village of Muzhevo on the banks of the Tunoshonka River, 20 km from Yaroslavl. Sanatorium Yasnye Zori is an amazing place where high-level treatment, good outdoor recreation and cozy atmosphere are successfully combined. The sanatorium was built in 1999, its area is 33 hectares, mostly it is a mixed, enchanting forest dominated by coniferous trees.

Scots pine (Pinus sylvestris), Norway spruce (Picea abies) and drooping birch (Betula pendula) are the predominant species, Sorbus aucuparia occurs in undergrowth.

According to the results of the phytosanitary assessment of tree plantations in the “Yasnye Zori” sanatorium, the following were noted:

- in Scots pine (Pinus sylvestris) - rot, growths, hollows, drying out and cancer; also on the trunk of a pine tree there are entrance holes from a bark beetle (Scolytidae) (Figure 1);

- in the drooping birch (Betula pendula) - frost cracks, outgrowths, hollows, rot, as well as the mushroom Trutovik beveled (Inonotus obliquus);

- in Rowan tree (Sorbus aucuparia) has rust, spotting, moth damage on the leaves (Figure 2);

- in Norway spruce (Picea abies) - cancer, shrinkage, rot.

Figure 1. *Scotch pine (Pinus sylvestris)*

Figure 2. *Rowan-tree (Sorbus aucuparia)*

Active rest in a sanatorium is just as important as receiving medical procedures and proper nutrition, in addition, physical activity improves the general condition of the body, cheers up and adds memorable moments from the rest. A large forested area around the resorts with wonderful views allows you to engage in both active and more relaxing outdoor recreation, it can be a health trail, paths for cycling, hiking and Nordic walking.

According to the results of the study of green spaces in the forest park zone of the sanatorium «Yasnye Zori» in the Yaroslavl region, it can be said that most of the woody plants are in good and satisfactory sanitary condition. However, damage, drying out, rot, diseases and pests of tree plantations were also noted.

Therefore, it is recommended to take measures to improve the general condition of green spaces and for the safe recreation of the population.

In resort forests, only maintenance felling, including sanitary and landscape felling, is allowed, and only to the extent that allows preserving the existing natural complexes in these forests, improving the composition and stability of forest biogeocenoses, and increasing their decorative and aesthetic properties. Landscaping and construction of forest parks in resort forests should be carried out according to specially developed projects that provide for such work that does not adversely affect the hydrogeological regime of mineral waters and therapeutic mud, sanitary and landscape-climatic conditions of resorts.

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上合组织国家的科学研究：协同和一体化

国际科学大会的材料

2023 年 5 月 19 日，中国北京

编辑A.A.Siliverstova
校正A.I.尼古拉耶夫

2023 年 5 月 19 日，中国北京
USL。沸点：98.7。 订单253.流通500份。

在编辑和出版中心印制
无限出版社