



SCIENTIFIC RESEARCH OF THE SCO COUNTRIES: SYNERGY AND INTEGRATION

上合组织国家的科学研究：协同和一体化

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

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These Conference Proceedings combine materials of the conference – research papers and thesis reports of scientific workers. They examine technical, juridical and sociological aspects of research issues. Some articles deal with theoretical and methodological approaches and principles of research questions of personality professionalization.

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CONTENTS

ECONOMIC SCIENCES

矩阵作为在 STR 进化的自然过程或周围世界变革中人工智能机制的细节之间进行选择的基础？

The matrix as the basis for choosing between the natural processes of the evolution of STR or the detailing of AI mechanisms in the transformation of the world around?

*Kharlanov Alexey Sergeevitch, Khudyakova Olga Yurievna,
Evans Julia Nailievna* 8

区域产业发展经济政策体系现代化对中央集权财政形成和运用的影响

The impact of modernization of the economic policy system of industrial development of the region on the formation and use of centralized state finances
Petrushevskaya Victoria Viktorovna, Struzhko Natalia Sergeevna 17

增强俄罗斯个人所得税的社会功能

Increasing the social function of the personal income tax in Russia
Denisova Irina Petrovna, Rukina Svetlana Nikolaevna 23

国家和地方财力资金形成的主要方面

The main aspects of the formation of state and regional funds of financial resources
Gryazeva Marina Sergeevna 27

金融资源基金设立的风险管理

Risk management in the formation of financial resource funds
Sorokotyagina Vladimira Leonidovna, Shary Kristina Vladimirovna 32

在不断变化的地缘政治和经济格局中实施贸易数字创新

Implementation of digital innovations in trade in a changing geopolitical and economic landscape
Nikolaichuk Maksim Nikolaevich 37

JURIDICAL SCIENCES

医疗犯罪的侦查和刑事诉讼的启动问题

Problems of detection of medical crimes and initiation of criminal proceedings
Volokhova Olga Viktorovna 42

法院实践及其在俄罗斯联邦司法中的重要性

Court practice and its importance in the administration of justice in the Russian Federation
Kakurina Marina Valeryevna, Sinina Anna Igorevna 50

现代思想家的教义中, 财产关系是君主和国家安全的一个因素 Property relations as a factor for the security of the monarch and the state in the teachings of the modern thinkers <i>Borisov Andrey Andreevich</i>	57
---	----

PEDAGOGICAL SCIENCES

互动课堂结构特征对研究生方法论素养形成的影响 Characteristics of the structure of interactive classes in the formation of methodological literacy of graduate students <i>Pivovarova Lyudmila Vasilyevna</i>	66
工业4.0背景下的技术教师培训 Technology teacher training in the context of Industry 4.0 <i>Kitaygorodskiy Mikhail Dmitrievich</i>	72
发展教育是现代教育的趋势 Developmental education is a trend in modern education <i>Vasilyeva Olga Ivanovna</i>	76
电子学习作为评估高等教育全纳教育质量的指标 E-learning as an indicator of assessing the quality of inclusive education in higher education <i>Bogdanova Elena Vitalievna, Fomenko Anna Valerievna</i>	82
俄罗斯大学对外俄语教学的特点和原则 Features and principles of teaching Russian as a foreign language in Russian universities <i>Kleiman Elina Ilyinichna, Tulieva Karina Vladimirovna, Khudaiberdina Marina Uralovna</i>	90

PHILOLOGICAL SCIENCES

A. S. 诗意中的英格兰形象 普希金 The image of England in the poetic by A.S. Pushkin <i>Zinovieva Oksana Alexandrovna</i>	95
---	----

PSYCHOLOGICAL SCIENCES

异常行为: 概念、类型、诊断和使用测谎仪的可能性 Deviant behavior: concept, types, diagnosis and possibilities of using a polygraph <i>Belykh-Silaev Dmitry Vladimirovich</i>	101
---	-----

BIOLOGICAL SCIENCES

大西洋鲑鱼 <i>Salmo salar</i> L. 胚胎在胚胎发生不同阶段的抗生素质活性 Antibiotic activity of Atlantic salmon <i>Salmo salar</i> L. embryo at different stages embryogenesis <i>Zhuravleva Nonna Georgievna</i>	111
人工智能 (AI) 在黑色素瘤诊断领域的现代能力 Modern capabilities of artificial intelligence (AI) in the field of melanoma diagnos <i>Vinogradskaja Irina Sergeevna, Sushko Sergey Alekseevich, Popov Mikhail Sergeevich</i>	114

十二烷基硫酸盐对溶菌酶的抑制作用
Inhibition of lysozyme by lauryl sulfate
*Gasanova Daria Alanovna, Wang Jing Wen, Ge Ying Di,
Levashov Pavel Andreevich* 119

食品工业用酶制剂中活性溶菌酶及其他蛋白质和肽杂质的测定
Determination of active lysozyme and impurities of other proteins and peptides in
enzyme preparations for the food industry
*Gasanova Daria Alanovna, Wang Jia Xin, He Miao,
Levashov Pavel Andreevich* 125

MEDICAL SCIENCES

俄语和英语中“临终关怀”概念的一些语义特征
Some semantic features of concept “hospice” in the Russian and English languages
Kirillova Tatyana Sergeevna, Gaydenger Ekaterina Anatolievna 133

高中生的发病率，取决于强度不同的学校教育形式
Morbidity rates in high school students, depending on the forms of schooling that
vary in intensity
*Muraviev Vadim Yurievich, Tayurskaya Zhanna Karlovna,
Petrova Elena Vladimirovna, Shchepetova Elena Vasilyevna,
Rostovetskaya Anna Vasilyevna* 138

Th17/Treg 细胞失衡作为非 LS 肺结节病的诊断和预后生物标志物
Th17/Treg cell imbalance as a diagnostic and prognostic biomarker in non-LS
pulmonary sarcoidosis
*Elgouhari Amro Samir Fawzi Omar, Lazareva Natalia Mikhailovna,
Ses' Tatiana Pavlovna* 144

预防下颌骨折并发症
Prevention of complications in fractures of the lower jaw
Turakhanov Saidkamol Valievich, Khramova Natalya Vladimirovna 152

TECHNICAL SCIENCES

农业企业智能可靠供能问题
Problems of reliable intelligent energy supply to agricultural enterprises
Belov Sergey Ivanovich 156

AGRICULTURAL SCIENCES

Se和I对不同块根作物微绿植物初始生长发育参数的影响
Effect of Se and I on initial growth and development parameters of microgreens of
different root crop species
Sindireva Anna Vladimirovna, Mangutova Anna Konstantinovna 163

农业副产品合理利用前景
Prospects for the rational use of secondary products of the agricultural industry
*Elina Maria Vadimovna, Potanin Dmitry Valerievich,
Maslich Evgeny Alexandrovich* 170

矩阵作为在 STR 进化的自然过程或周围世界变革中人工智能机制的细节之间进行选择的基础？

THE MATRIX AS THE BASIS FOR CHOOSING BETWEEN THE NATURAL PROCESSES OF THE EVOLUTION OF STR OR THE DETAILING OF AI MECHANISMS IN THE TRANSFORMATION OF THE WORLD AROUND?

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抽象的。作者试图以现有能力矩阵的形式分析人工智能和神经算法在业务流程和全球经济转型中日益增长的影响。他们还广泛数字化的影响程度、毒性和充分性以及机器人系统对整个人类存在的真正影响进行了预测。

关键词：人工智能、大数据、工业 4.0、神经算法、超级智能、矩阵。

Abstract. *the authors try to analyze the growing influence of AI and neural algorithms in business processes and the transformation of the global economy, in the form of a matrix of existing capabilities and competencies. They also give forecasts on the degree of influence, toxicity and adequacy of widespread digitalization and the true influence of the robotic system on the entire existence of humanity.*

Keywords: *AI, Big Data, Industry 4.0., neural algorithms, superintelligence, matrix.*

Industry 4.0., as a gradually implemented robotic-humanoid way of behavioral economics by Daniel Kahneman and Richard Thaler, requires increasingly higher capital turnover rates, returns from introduced innovations, more targeted and effective solutions that correct existing business processes and allow each participant in the process to go through a constant “check control” on its dress code of compliance and adequacy with the emerging realities [1]. At the same time, philosophical schools about the dangers and benefits of generative AI algorithms (Elon Musk warns about the dangers of using AI and its accelerated evolution to the state of superintelligence, a kind of “supermatrix” of possibilities that can destroy humanity or drive us off the planet into outer space, like a useless virus or weed, on the one hand, and the Asian philanthropic expectation of the further use of robotics in the processes of helping people and the ability to disinterestedly, 24/7, fulfill any whim of the human mind, - on the other), the growing ability of chats and bots to test and optimize the costs of materials and time based on Big Data and accelerated growth of the “tree of goals” of constantly self-improving machine learning, used in mechanisms for research, analysis and forecasting of entire arrays and data of various levels of complexity and comparability, which pose the task of fatally or intuitively deciding for humanity: in what place the scientific and technological revolution will give people its window of opportunity for dominance in the ICT industry and related digital industries that depend on various materials science content. And the choice of these structures that implement their proposals at a unique or modified level for specific applied tasks is just an application for an attempt to guess this or that trend, to become part of the process of energy saving, the “green agenda” or “carbon-free footprints”, immorally and unreasonably imposed by the West for newly industrialized countries [1;9]. This targeted policy has a colonial and hegemonic character from the standpoint of the power of reason, “smart power” and “soft power”, “soft power” being incorporated into the business and production agenda, allowing only later to assess the consequences of ESG standards and the new business models of reindustrialization being practiced “knowledge economy”, depending on the background of each participant.

The outcome of this discussion is the statistics of the application of the brilliant insights of Steve Jobs and the dreams of the “kingdom of artificial intelligence” of Sam Altman, which led to the use of the most commonly used AI technologies in 2023, which included the following components of the movement from weak and unsystematic AI to superintelligence, which, according to analysts, will become complete and practically invulnerable by the beginning of the next century [1;2]:

1. Machine learning: is a technology that allows computers to learn without being explicitly programmed. Machine learning is used for data analysis, pattern recognition, forecasting and other applications.

2. Natural Language Processing (NLP): This is the field concerned with the understanding and processing of human language by computers. NLP is used to create chat bots, automatic translation systems, text analysis and other tasks (Fig. 1).

3. Computer Vision: A technology that allows computers to analyze and understand images and videos. Computer vision is used in video surveillance systems, automatic image classification, face recognition and other areas.

4. Robotics: Using artificial intelligence to develop autonomous robots and devices capable of performing various tasks such as manufacturing, medical diagnosis and maintenance.

5. Automation of processes and solving business problems: introduction of artificial intelligence to automate routine business processes, analyze data and make management decisions.

These technologies are actively used in various industries, such as healthcare, finance, manufacturing, transport and others, and they continue to develop and be used more and more widely [1;2].

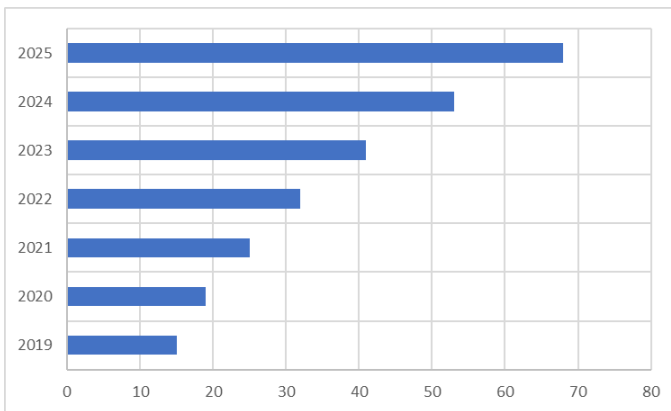


Figure 1. Growth of the Big Data analytics market (billion dollars)

There is a common belief that “smart” technologies are available only to large companies or macro- and meso-level businesses. This is not entirely true. Currently, smart technologies are available to a wide range of users, including small companies and individuals. There are many innovative products and services that can be used by almost any business actor or organization. In addition, many new technologies are becoming increasingly accessible and inexpensive, making them acceptable and desirable even for small companies (nano- and micro-level) and individuals (Fig. 2). [2]



Figure 2. Degree of completion of work on the implementation of AI technologies in Russian companies, %. Source: RAEC/Higher School of Economics

Table 1 presents selected AI-based tools that facilitate data collection, organization, and analysis. These services, according to their developers, are suitable not only for beginners in the analysis of researched and sorted data, but also for professionals, and also as so-called “self-service analytics”. Some of them are completely free, most marketers provide basic features for free, and others have a promotional free period [1;2].

Table 1
Some AI-based services that facilitate data analysis

Service	Possibilities:	Price:
AskEdith The service simplifies data analysis by allowing users to ask questions and get instant information.	<ul style="list-style-type: none"> Ability to question data without the need for SQL Ability to analyze large volumes of data Compatible with all databases and CRM (Google Sheets, Airtable, PostgreSQL, MySQL, SQL Server, Snowflake, BigQuery and Redshift, etc.) 	starter package is free, other packages from \$60
Tomat.AI A tool that allows data scientists to easily explore and analyze large CSV files without the need for coding or writing formulas.	<ul style="list-style-type: none"> Filter, sort, group rows using intuitive drag and drop steps Merging multiple files Creating a visualization 	completely free

Scientific research of the SCO countries: synergy and integration

<p>Chat With Data A tool that allows you to extract valuable information from data files as requested. Data types: pdf, xlsx, docx, csv, sql.</p>	<p>Examples of data questions:</p> <ul style="list-style-type: none"> • Which costs are the most significant and how can they be optimized? • What are the main tasks, steps and responsibilities outlined in the contract? • Which contacts or customer segments on the list are most valuable? • Find the contacts you need from your mailing list 	<p>the starter package is free, then from \$10</p>
<p>Coginiti The service allows you to generate SQL queries using natural language hints, optimize existing SQL queries, explain common SQL in an integrated catalog, provide detailed explanations and solutions to errors, and explain query execution plans for better optimization.</p>	<ul style="list-style-type: none"> • Instant assistance in making a request • Help explain the request • Improved query performance (and reduced compute costs) • Access to all your data warehouses (Redshift, Microsoft, Snowflake, IBM, bigquery, Yellowbrick and Databricks, etc.) • Personal repository for SQL queries 	<p>free 30-day period without linking a card, then from \$189 per year.</p>
<p>Formula God A tool built into Google Sheets that allows users to manipulate and calculate data across a full range of cells.</p>		<p>Starter plan is free, then from \$9.99</p>
<p>Speak Ai A service for recording and transcribing audio and video files, for analyzing and creating summaries from recordings. The tool also offers a shared media repository, an AI-powered text system, and a SWOT analysis solution, among other features.»</p>	<ul style="list-style-type: none"> • Online Meeting Assistant automatically joins, records, transcribes and analyzes your meetings • You can also upload your audio, video and text • Ability to ask questions about language data and get answers using Speak Magic Prompts • Ability to obtain visualized data 	<p>the starting plan is free, then from \$59 per month.</p>

When integrating various artificial intelligence tools and services into production, businesses face a number of problems (Fig. 3).[3]

First, for successful implementation of AI, it is necessary to have large amounts of data for training neural machine learning algorithms. Most organizations may be faced with the problem of a lack of quality data and its subsequent formatting and separation during use. Secondly, integrating existing levels of management

and management into an organization with AI requires data and analytics specialists who can develop and implement machine learning algorithms. This can be difficult and expensive for many companies. Third, when AI algorithms can be unpredictable, this raises concerns about their transparency and reliability, especially in industries that require explanations for decisions. The very social aspect of urbanizing “closed loop” communities may raise questions about the desirability and necessity of using AI in business, and may also raise fears of “data leaks” due to hacking attacks and data confidentiality, as well as the impact on jobs if they are too accelerated evolution and on the composition of the labor resources of the futurological society as a whole. [4]

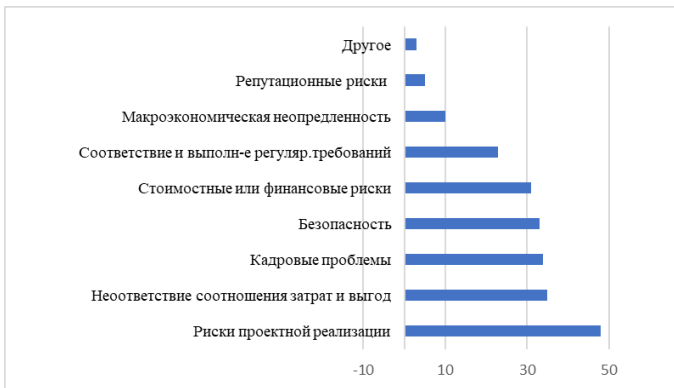


Figure 3. Risks of introducing AI technologies in Russian companies, %

Solving these problems typically requires investment in staff training, improved data collection systems, and development of policies on transparency and ethics, awaiting acts and bills of rights for machines (AI) in the humanistic society of Homo sapiens [9].

It should be noted that certain aspects of these problems are being solved today outside the framework of our desires or lack thereof. AI is constantly evolving and significant changes and improvements have been observed in certain key aspects:

1. Deep learning and neural networks: Development of deep learning continues, including the development of new neural network architectures, optimization algorithms, and knowledge transfer methods, which can improve the performance of AI systems in solving complex problems.

2. Expanding the scope of application: AI technologies are being actively implemented in a variety of areas, such as healthcare, the automotive industry, finance, agriculture and others. This includes the creation of autonomous cars, disease diagnostic systems, financial analytical tools, etc.

3. Merging AI and the Internet of Things (IoT): AI is becoming an integral part of smart, green, lean home, smart city, and other IoT-enabled systems, resulting in more efficient and intelligent environments. avg.

4. Ethics and Transparency: As the use and influence of AI increases, so too do concerns about its ethical and social aspects, including transparent decision-making, privacy and data security, and liability issues for AI-powered systems that are already crowding the knowledge and speed of change of its original developers and operations specialists, system administrators and neural network engineers.

5. Reinforcement learning: The development of machine learning methods based on reinforcement learning makes it possible to create more efficient systems that can learn from interaction with the environment and accumulate experience [5].

These trends in artificial intelligence are only a small part of a larger process, and affect many aspects of our daily lives.

Artificial intelligence (AI) can be combined with various other technologies to create innovative and improved solutions. Some of these technologies include: Internet of Things (IoT), blockchain, robotics, big data, cybersecurity. Combining AI with other technologies allows for smarter, more efficient, and innovative solutions in areas ranging from healthcare to manufacturing to transportation [6].

Big data is a term that is often used to describe large volumes of data that cannot be processed or analyzed using traditional methods. Big data can come from various sources such as social media, sensors, internet traffic, transactions, etc. Processing and analysis of big data requires special methods and tools, such as distributed data storage systems, parallel computing, machine learning, etc. This allows companies and organizations to extract valuable information and make more informed decisions based on data, engage in process analytics, and clarify the tasks of operational and strategic planning [7;8].

Data scientists, data engineers, big data analysts, database administrators, machine learning engineers, business data analysts, and other information technology professionals work with big data. In addition, many companies have special divisions or teams that specialize in working with big data. These professionals process, analyze, interpret, and visualize large volumes of data to extract valuable information for business or scientific purposes.

Large data visualization is the process of presenting information from large data sets in the form of graphs, charts, maps, and other visual elements. The task of data visualization is to make complex information more understandable and accessible to understanding, as well as to discover hidden patterns and trends [8;10].

To visualize large amounts of data, special tools are used, such as Tableau, Power BI, QlikView, D3.js, matplotlib, and many others. These tools allow you to create interactive graphs, charts, and other visual elements that help you explore and analyze data more effectively [9].

Big data visualization is often used to analyze data in business, science, medicine, finance and other areas where processing large amounts of information is required. This helps you make informed decisions based on data and discover important patterns and trends hidden in large volumes of data.

Interpreting large volumes of data means analyzing, processing and understanding vast amounts of information collected from various sources. This may involve the use of special programs and algorithms to process data to find patterns, trends, and relationships between various variables. Data interpretation may also include the creation of visualizations, special graphic editors, or machine bots to better understand and present information [10].

Interpreting large amounts of data can be useful for making business decisions, developing new products and services, analyzing markets, forecasting trends, and many other areas. It is important to remember that interpreting data requires careful consideration and a proper understanding of the context to avoid mistakes and incorrect conclusions.

When interpreting large volumes of data, one can discover various patterns and trends that may be hidden in them: seasonal fluctuations, correlations, trends, anomalies, groupings and clusters [11].

Data analysis using specialized tools and machine learning techniques reveals these patterns and trends, which can be useful for decision making in business, science and other fields. The speed of combining practical results from the influence of AI and building philosophical concepts for the coexistence of robots and people in a single information and production space will be able to convince us of Industry 4.0: what is this, the “beginning of the end” or the next round of evolution, with the transition of quantitative changes into qualitative ones, making cyborgs a zone of creative creation, and the world is more predictable and technically dependent on AI, as the “root of evil”, but also “eternal life”... there is only one question: who will appreciate these results, because man ceases to be a humanoid and becomes a symbiosis of machine and biomass...

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区域产业发展经济政策体系现代化对中央集权财政形成和运用的影响
**THE IMPACT OF MODERNIZATION OF THE ECONOMIC
POLICY SYSTEM OF INDUSTRIAL DEVELOPMENT OF THE
REGION ON THE FORMATION AND USE OF CENTRALIZED
STATE FINANCES**

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注解。 本文探讨了该地区工业发展经济政策体系现代化对中央集权财政的形成和使用的影 响。 突出工业发展的经济政策体系机制，展示中央集权财政形成和使用的有效工具。

关键词：金融、集中金融； 公共财政、中央财政管理、经济政策、产业发展、产业发展的经济政策、区域。

Annotation. *The article examines the impact of modernizing the system of economic policy for industrial development of the region on the formation and use of centralized state finances. The mechanisms of the economic policy system for industrial development are highlighted and effective tools for the formation and use of centralized state finances are displayed.*

Keywords: *finance, centralized finance; public finance, centralized financial management, economic policy, industrial development, economic policy of industrial development, region.*

Industry is one of the most important sectors of the economy, having a significant impact on the development of production forces, the formation and use of centralized finance. The level of use of industrial potential affects the social efficiency of the economy and the standard of living of the population. The organization of a management system for the industrial sector in a modern economy plays an important role in achieving effective management of the centralized finances of the state. Ensuring high rates of industrial development and the level of profitability of industrial enterprises in the region is impossible without the effective use of

economic policy tools for industrial development as a key aspect of the economic mechanism that accumulates all resources, thanks to the effective use of which it is possible to carry out basic economic and financial processes, to form balanced production and economic relations between entities management, create added value and effectively distribute finances at various levels of management.

To ensure sustainable development of industry in the modern economy, where there are multiple global challenges and risks, a holistic system of adoption and implementation of government decisions (both at the national (federal) and regional levels), that is, the formation and implementation of economic policy for industrial development [5].

In the conditions of modern transformational changes in all spheres of public life, existing principles for the formation and implementation of economic policy for industrial development require appropriate justification and improvement [2]. An important role in the formation and implementation of economic policy for the industrial development of the region is played by various methods, which represent a set of means and approaches used by the state through legislative and executive bodies to influence enterprises and companies in order to create or ensure conditions for their activities.

The most common methods of forming and implementing economic policy for industrial development include the following: economic - involve the creation by the state of conditions, the fulfillment of which determines the corresponding activities of economic entities to be economically profitable, while the state influences their activities through appropriate financial and economic instruments; socio-psychological - are based on openness of information and broad participation of society in the economic policy of industrial development of the region and involve the clarification and popularization of certain ideas on the directions and trends of industrial development in the region. An important stage in the study of the theoretical and methodological foundations of the economic policy of industrial development is the determination of the essence, content and identification of the mechanisms of its formation and implementation. Thus, it is advisable to define the fundamental features of the mechanism for implementing industrial policy: maximum focus on one's own capabilities; use of the mechanism of program-target planning and development of annual programs, plans and forecasts of economic development, taking into account the specific situation; a combination of government influence and market regulators on industrial production [1].

Modernization of the system of economic policy for industrial development of the region can have a significant impact on the formation and use of centralized state finances. The introduction of modern methods and tools for industrial development in the region can help increase production, improve product quality, increase the competitiveness of enterprises and grow the economy as a whole [7].

This, in turn, can lead to an increase in enterprise income and tax revenues to the state budget.

The most important direction in the formation and implementation of the economic policy for the industrial development of the region should be the modernization of the real sector of the economy, allowing the formation of a new innovative and technological core, the basis of which should be the regional innovation system, because the existing accumulation funds at enterprises cannot expand reproduction on an innovative basis [4]. As part of the modernization of the system for the formation and implementation of the economic policy for industrial development of the region, the following mechanisms were identified: financial and economic, information and monitoring (Fig. 1.1).

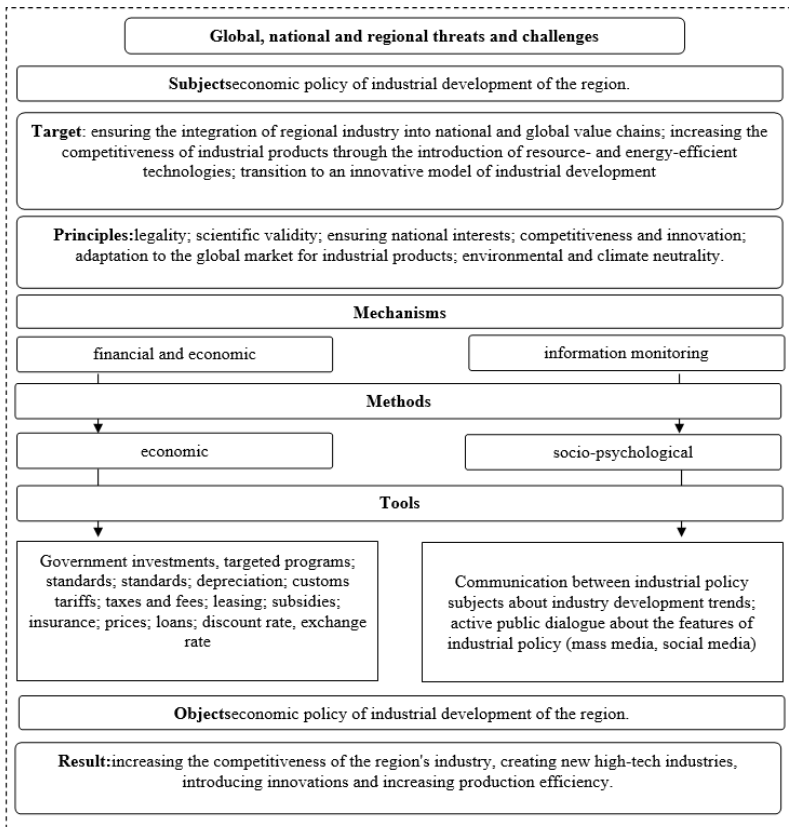


Figure 1.1. System for the formation and implementation of economic policy for industrial development of the region

The financial and economic mechanism for the formation and implementation of the economic policy of industrial development of the region is a set of financial and economic incentives, levers and instruments provided for by law with the help of which the sustainable investment and innovative development of the industry of the region is ensured (or should be ensured) at the expense of sources specified by law: funds from budgets of different levels, funds of legal entities and individuals, foreign investors, credit resources of financial institutions, etc. [3].

The financial and economic mechanism for the formation and implementation of the economic policy for industrial development of the region includes the following instruments: public investment; economic standards and limits; depreciation deductions; customs tariffs; taxes and fees; targeted programs and projects; leasing; insurance; subsidies; targeted financing on a non-repayable basis and provision of interest-free loans for the development of industrial parks; exemption of business entities involved in industrial parks from equity participation in the development of infrastructure of settlements; ensuring the preferential right to use a land plot for the implementation of an investment project; provision of construction of related infrastructure facilities using financial resources from various sources.

The information and monitoring mechanism should help highlight the features of the formation and implementation of the economic policy of industrial development of the region through the use of information and propaganda campaigns and comprehensive monitoring of industry development, which is due to the lack of an integrated regional information platform for business entities, especially small and medium-sized businesses, for example, regarding the order and rules for the export of industrial products to world markets, low awareness of industrial enterprises about changes in industrial, tax, customs legislation, etc.

The information and monitoring mechanism is an important area of government influence in the areas of formation and implementation of economic policy for industrial development of the region through information and monitoring components through explanatory work, interactive dialogue, meetings, trainings, presentation events, press briefings, press releases, publication of reports and publication of forecasts and expectations for industrial development and transformation of the economic policy of industrial development of the region, creation of platforms for communication between experts on problems of industrial development, etc.

To effectively implement the economic policy of industrial development of the region, it is proposed to use a number of tools to support economic entities in the region's industry. These include financial support, including the provision of subsidies for financing, creation and modernization of industrial infrastructure. Also important are tax benefits provided for by the legislation on taxes and fees,

as well as information and consulting assistance. Support for scientific, technical and innovative activities in the industrial sector, development of human resources, as well as support for foreign economic activity play important roles. Additional measures include the provision of state and regional preferences from different levels of the budget system.

providing financial support to industrial entities in the form of loans, grants, contributions to the authorized capital, financial lease (leasing);

financing the creation of infrastructure for industrial parks and industrial clusters that meet the priorities defined in regional development plans and programs and relevant regional development strategies.

In addition, modern challenges require government bodies to use new means and instruments of communication directly with broad sections of the population, to respond to political reproaches towards state and regional authorities, local governments in the areas of reforming regional industry [6]. Therefore, we believe it is necessary for authorities at all levels to be actively present in the media, explaining the features and complexities of the industrial development of the region and publishing analytical information on the areas of formation and implementation of economic policy for the industrial development of the region.

Thus, based on the research conducted, we can conclude that only by ensuring the implementation at the national (federal) and regional levels of the above goals, principles, methods, mechanisms and instruments of economic policy for the industrial development of the region will additional improvements in the efficiency of decentralized finance management be revealed. In addition, in the conditions of the modern economy, the sustainable development of industry in the region is the basis for the development of a competitive economy, the key to ensuring national financial and economic security.

Improving the efficiency of the industrial sector can also help reduce import dependence and stimulate domestic demand. Central government finance can be used to support industrial modernization, for example through subsidies for infrastructure development, workforce training, research and development, or stimulating innovation. Thus, modernizing the system of economic policy for industrial development of the region can help improve the efficiency of using centralized state finances and national financial and economic security.

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增强俄罗斯个人所得税的社会功能
**INCREASING THE SOCIAL FUNCTION OF THE PERSONAL
INCOME TAX IN RUSSIA**

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注解。 文章对俄罗斯2021年实行的个人所得税累进规模征税制度进行了评估，并建议短期内将标准减税额规模指数化，长期内将标准减税额规模指数化。用维持生计水平来代替它们。

关键词：累进规模、税收减免、生活工资、社会正义。

Annotation. *The article provides an assessment of the system introduced in 2021. into the Russian practice of a progressive scale of taxation of personal income, and it is also proposed to index the size of standard tax deductions in the short term, and in the long term to replace them with the subsistence level.*

Keywords: *progressive scale, tax deductions, living wage, social justice.*

A special place in the country's tax system is occupied by the main direct tax on the population - the personal income tax, which since 2001 has been regulated by Chapter 23 of the Tax Code of the Russian Federation [1]. Personal income tax, unlike many other mandatory payments, plays a critical role in the formation of the budget fund and at the same time can be used to regulate socio-economic processes, significantly affecting the income and standard of living of the population due to the extremely wide coverage of taxpayers [2]. At the same time, achieving a balance between the fiscal efficiency of the tax and its social justice is the subject of heated debate. The changes taking place in the socio-economic development of the country lead to the need to improve the taxation of income of various categories of individuals.

Since 2021, a progressive scale of taxation of personal income has been introduced into the Russian taxation system. The need for its introduction is associated with a change in the socio-economic situation compared to the 2000s, when Chapter 23 of the Tax Code of the Russian Federation began to be applied. First,

the number of high-income taxpayers has increased; secondly, the efficiency of tax administration has increased; thirdly, under the conditions of economic sanctions, a shortage of funds has arisen in the regions for which personal income tax is the most important revenue source for the consolidated budgets of the constituent entities of the Russian Federation. The main argument of supporters of a progressive taxation scale is the assertion that a flat scale did not contribute to the establishment of social justice among citizens [3].

The increased personal income tax rate of 15% operates along with the 13% rate. An increased rate is established for income exceeding 5 million rubles. in year. Personal income tax is calculated at this rate in the amount of 650.0 thousand rubles. and 15% on income exceeding 5 million rubles. However, not all income received by an individual is included in his total income. Additional personal income tax revenues received by the budget are targeted and are used to treat children with rare diseases.

Personal income tax growth rate in 2021-2023 indicate a lack of reaction on the part of taxpayers, expressed in concealing income from taxation. The introduction of a personal income tax rate of 15% did not significantly change the behavior of taxpayers; they did not use schemes to conceal income. In our opinion, a two-level scale of taxation of personal income is an important measure aimed at the stability of regional budgets and the redistribution of the tax burden between different groups of the population. The introduction of a tax rate of 15% for income exceeding 5 million rubles will make a significant contribution to the empirical basis for studying the problems of taxation of income of Russians.

Currently, the Tax Code of the Russian Federation provides for six types of tax deductions:

- 1) standard tax deductions (Article 218 of the Tax Code of the Russian Federation);
- 2) social tax deductions (Article 219 of the Tax Code of the Russian Federation);
- 3) investment tax deductions (Article 219.1 of the Tax Code of the Russian Federation);
- 4) property tax deductions (Article 220 of the Tax Code of the Russian Federation);
- 5) tax deductions when carrying forward losses from transactions with securities and transactions with financial instruments of futures transactions (Article 220.1 of the Tax Code of the Russian Federation);
- 6) professional tax deductions (Article 221 of the Tax Code of the Russian Federation) [1].

The essence of tax deductions is that an individual does not pay income tax on a certain amount of income received (standard tax deductions) or has the op-

portunity to return part of the tax amount paid to the budget (for example, social and property tax deductions).

In Article 218 - 221 of the Tax Code of the Russian Federation stipulate not only the types and amounts of tax deductions, but also the circumstances necessary to obtain them: the fact that the taxpayer has received income, the fact that the taxpayer is classified as a tax resident; the fact that the taxpayer has received income subject to taxation at a rate of 13% or at a rate of 15%.

In world practice, one of the most important tax benefits for the population is the non-taxable minimum, the essence of which is that the income necessary to maintain the life and health of citizens should not be taxed. In Chapter 23 of the Tax Code of the Russian Federation such a concept is not enshrined. In modern practice of applying personal income tax, the role of the minimum income, which is exempt from taxation, is played by a standard tax deduction for certain categories of individuals.

The use of standard tax deductions inherently creates a tax-free amount of income for the taxpayer. The specific amount and procedure for applying standard deductions, in accordance with Article 218 of the Tax Code of the Russian Federation, depends on the category of taxpayers who have the right to use them. Conventionally, all standard tax deductions can be divided into two groups: 1) deductions for individual categories of taxpayer; 2) deductions for children. The size of standard tax deductions is currently fixed for each category: 3000 rubles, 1400 rubles, (3000 rubles, 6000 rubles, 12000 rubles), 500 rubles. The main disadvantage is the lack of indexing. Therefore, we consider it necessary to resolve this issue in the short term. In the long term, when the economic situation stabilizes, it is possible to establish the cost of living as a standard tax deduction when calculating the amount of personal income tax.

In general, it can be argued that the introduction of progressive taxation is a positive step towards the creation of a socially oriented tax system. Due to the increasing contribution of the wealthiest citizens in the formation of increasing budget revenues, it is possible to increase the volume of financing of public needs, which to some extent levels out the level of social inequality of the population. Thus, the implementation of the social function of the personal income tax helps reduce monetary inequality among citizens, ensure social justice of income taxation and balance regional budgets.

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国家和地方财力资金形成的主要方面
**THE MAIN ASPECTS OF THE FORMATION OF STATE AND
REGIONAL FUNDS OF FINANCIAL RESOURCES**

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注解。 本文讨论了国家和地方财力资金形成的主要理论问题。 分析了财务资源形成的一般来源。

关键词：国家财政资金、地方财政资金、预算、税收收入、投资。

***Annotation.** This article discusses the main theoretical aspects of the formation of state and regional funds of financial resources. The general sources of formation of financial resources are analyzed.*

***Keywords:** state funds of financial resources, regional funds of financial resources, budget, tax revenues, investment.*

Modern theoretical and methodological studies of various aspects of the formation of state and regional funds of financial resources are characterized by a significant diversity of views on the process (analysis of macroeconomic factors influencing the formation of funds; various methods of formation and management of funds; transparency and accounting of state and regional financial resources; study of the role of regional funds in the system of public financing), which determines the variability of scientific approaches to the definition of state and regional financial funds.

The main connecting link in the financial structure is the relationship between the federal, regional and territorial budgets [1]. Each component of the financial system involves financial relations through which certain types of monetary funds are created and used in order to cover consumer demand for social needs.

State funds of financial resources are special financial instruments created for the accumulation and management of various types of financial assets by accumulating funds from various sources (such as taxes, revenues from the sale of natural resources, as well as other budget revenues), for the purpose of hoarding and management various types of financial assets to ensure the financial stability

of the state, support economic development, social protection of the population, investing in key sectors of the economy, etc.

At the state level, the formation of funds of financial resources includes the following elements:

- taxes as the main source of income for the state, including direct taxes on income, property and inheritance, as well as indirect taxes on goods and services;
- non-tax revenues in the form of contributions, fees, license payments, fines and other payments that are not taxes;
- borrowed funds by attracting borrowed funds by the state to finance its needs through the issuance of government bonds, credits and loans;
- income from state property, which represents dividends, lease payments, sales of state property and other receipts from state-owned enterprises and assets;
- international financial resources as funds received from international organizations, creditors and investors in the form of assistance, loans or investments.

Regional funds of financial resources are special financial instruments created at the regional or municipal level for the accumulation and management of various types of financial assets, with the aim of investing in the development of the region, supporting social programs, ensuring budget stability, etc. [2,3].

At the regional level, the formation of funds of financial resources includes:

- tax revenues, in the form of tax revenues, similar to the national level;
- interbudgetary transfers - funds that regions receive from the federal budget in the form of subsidies, subsidies and other transfers to cover their expenses;
- income from local and regional enterprises - income from dividends, rental payments and other income from enterprises owned by the region;
- borrowed funds. Regions attract borrowed funds through the issuance of bonds, credits and loans to finance their projects and programs;
- subsidies and grants from international organizations. Regions receive financial support from international organizations in the form of grants or assistance.

The above funds of financial resources are special organizations or structures that are managed by federal authorities and the authorities of the constituent entities of the federation in order to ensure the stability and sustainability of the economy, as well as support social programs and infrastructure development. They are used to invest in various sectors of the economy, support entrepreneurship, develop science and education, and also to ensure social protection of the population.

An analysis of modern economic literature on the issue of forming funds of financial resources at the state and regional levels allows us to identify several main approaches.

The first approach links the creation of funds with the financing of social and economic programs and projects. They are used to support industry, infrastructure, education, healthcare and other areas of life. In this case, the main task of forming funds is related to finding sources of financing and identifying effective mechanisms for their use.

The second approach involves the formation of state and regional funds as an instrument of economic stabilization. They are used for the reserve accumulation of financial resources in order to mitigate the consequences of economic crises and ensure the financial stability of the state or region. It is important to determine the optimal volume of the fund, the rules for its use and the transparency of the process.

The third approach links the formation of funds with the aim of ensuring long-term investment. State and regional funds are used to invest in various types of assets, such as stocks, bonds, real estate and others. The main task in this case is to maximize the fund's profitability while minimizing risks.

All three approaches have their advantages and disadvantages, and the choice of a particular approach depends on the specific economic situation and the goals of the state or region. Some authors also note the need for rational management of funds, transparency and openness of the process of formation and use of resources. This includes developing effective mechanisms for monitoring and accounting for the use of funds, as well as reducing the possibility of corruption and misuse of funds.

To effectively achieve your goals, you should study the characteristics of the sources of financial resources, which are diverse and depend on the specific situation and level of management: the state as a whole or individual regions.

The sources of formation of state and regional funds of financial resources have some differences, which are associated with different levels of government and their powers. They are reflected in the powers and responsibilities between the state and regional levels of government, as well as in the specifics of their financial activities. General sources of financial resources are presented in Table 1.

Table 1
General sources of formation of financial resources of the state and region

Source name	Characteristic	Advantages	Flaws	Differences
Taxes	Taxes levied on citizens, enterprises and organizations are one of the main sources of financial resources for the state and the region.	A sustainable and permanent source of income for the state and region. Provide social security. The taxation system ensures the principle of fairness.	High taxes have a negative impact on economic activity. Misuse of collected taxes. Taxation is unfair and discriminatory.	State funds are formed from tax revenues at the national level; regional funds also receive income from taxes, but this applies to taxes collected in a particular region.

Scientific research of the SCO countries: synergy and integration

Fees and duties	The state/region receives revenue from various fees and charges, such as vehicle registration, licenses, etc.	Flexibility. Target orientation. Justice.	Possibility of leakage of funds. Negative impact on the economy. Injustice. Bureaucratic obstacles.	Fees and duties are common to the state and regional levels; their establishment, purpose, and level of regulation vary depending on the level of government.
Transfers from other levels of government	Regional and local authorities receive financial support from the central government or other levels of government in the form of transfers or subventions.	Increase in budget revenues. Reducing financial burden. Stability of financial resources.	Budget limitations. Dependence on other authorities. Complicated controls.	State funds receive income from intergovernmental transfers and international organizations, while regional funds also receive intergovernmental transfers, but both from the central government and from other regions.
Borrowed funds	The state/region attracts borrowed funds through the issue of government bonds or loans from international financial institutions.	Availability. Empowerment. Financial leverage.	Financial obligations. Interest rate risks. Bank restrictions. Dependence on external sources.	Conditions, purpose and sources vary depending on the level of government.
Income from state property	Income from state enterprises, natural resources, as well as income from the sale of state property.	Stability of income. Control and regulation. Ensuring national security. Social responsibility.	Risk of political interference. Limited innovation. Lack of motivation to improve:	The ways in which these revenues are managed and distributed vary depending on the level of government.
Other income	The state/region receives revenue from various other sources, such as auctions, sales of natural resource rights, fines and penalties, and charitable contributions.	Diversity of income sources. Opportunity to increase overall income. Minimizing risks.	Additional expenses. Development of competitive advantages. Risk of failure.	State funds receive income from various sources, such as the sale of state property, income from investments. Regional ones receive income from local enterprises, rental payments, etc related to regional activities

The formation of state and regional funds of financial resources helps ensure financial stability, develop investment resources and social support, stimulate economic growth and ensure long-term budget sustainability. These theoretical recommendations are adapted to the specific situation and needs of the state and

region to achieve optimal use of financial resources. It is advisable to continue further development of theoretical recommendations for optimizing the effective use of financial resources with an analysis of the influence of the finances of enterprises and households on the formation of state and regional funds of financial resources.

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金融资源基金设立的风险管理
**RISK MANAGEMENT IN THE FORMATION OF FINANCIAL
RESOURCE FUNDS**

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注释: 本文考察了考虑风险因素的金融资源资金的形成和管理。发现的问题和潜在威胁可能成为俄罗斯经济风险事件的催化剂。研究了集中式和分散式基金组建中的风险管理方法。通过集中式和分散式金融资源形成的风险管理算法来设计,旨在提高对潜在风险事件的预测。

关键词: 财务、资金、管理、发展、战略、风险。

Annotation.*The article examines the formation and management of funds of financial resources by taking into account the risk factor. Problems and potential threats identified, capable of becoming catalysts for risky events in the Russian economy. Methods of risk management in the formation of centralized and decentralized funds have been studied. Designed by a risk management algorithm in the formation of funds of centralized and decentralized financial resources, aimed at improving the forecasting of potential risk events.*

Keywords: *finance, funds, management, development, strategy, risk.*

The development of financial resource funds is currently associated with many risks that have a significant impact on the functioning of both centralized and decentralized funds, which necessitates the need to take into account potential risk events when forming financial resource funds.

In accordance with Article I of the Strategy for Scientific and Technological Development of the Russian Federation [1], the development of the Russian Federation is subject to the influence of many challenges, i.e. a set of problems, threats and opportunities, the complexity and scale of which are such that they cannot be solved, eliminated or implemented solely by increasing resources, and which objectively require a response to them from the state. Consequently, the role of science and technology in ensuring the sustainable future of the nation, in the development of Russia and de-

termining its position in the world is very great. After all, it is through solving certain scientific problems that it becomes possible to solve the problem of risk management in the formation of funds of financial resources.

In addition, the achievement of state policy goals in the field of ensuring economic security, stated in the Economic Security Strategy of the Russian Federation for the period until 2030 [2], is also hampered by various threats that can become catalysts for risky events in the Russian economy. At the present stage of world development, objective signs of the destruction of the unipolar world are clearly visible. At the same time, the process of transition to multipolarity is accompanied by an increase in geopolitical instability and instability in the development of the world economy, and a sharp intensification of global competition. There is a desire to redistribute influence in favor of new centers of economic growth and political attraction. Significant changes are taking place in the field of international law, military-political and economic fields.

International economic relations are increasingly influenced by factors that pose a threat to economic security. There has been an increasing tendency to spread challenges and threats of a military-political nature to the economic sphere, as well as the use of economic methods to achieve political goals [6]. This necessitates risk management when forming funds of financial resources at both the macro and micro levels.

It is important to ensure transparent, effective risk management, compliance with laws and regulations, and accountability to stakeholders. Issues of managing the development of centralized and decentralized funds of financial resources, taking into account the risk factor, require scientific research that meets modern challenges. It should be noted that the formation of centralized and decentralized funds of financial resources has specifics and certain management features.

The methodology for managing the risk of developing centralized funds of financial resources (hereinafter referred to as CFFR) and decentralized funds of financial resources (hereinafter referred to as DFFR) is shown schematically in Figure 1.

Risk management of decentralized funds of financial resources is based on a certain set of methods that make it possible to reduce the level of threat when a risk event occurs. Risk management methods for decentralized financial resource funds are as follows:

Autonomous risk management, whereby decentralized funds can provide autonomy to local risk management units or managers;

- regular monitoring that decentralized funds carry out at the local level and report to the head office for overall analysis and coordination;
- local risk management – decentralized funds of financial resources primarily specialize in managing local risks associated with specific market conditions, legislation and political events;

- investing in local staff training and development to ensure the required level of risk management competency.

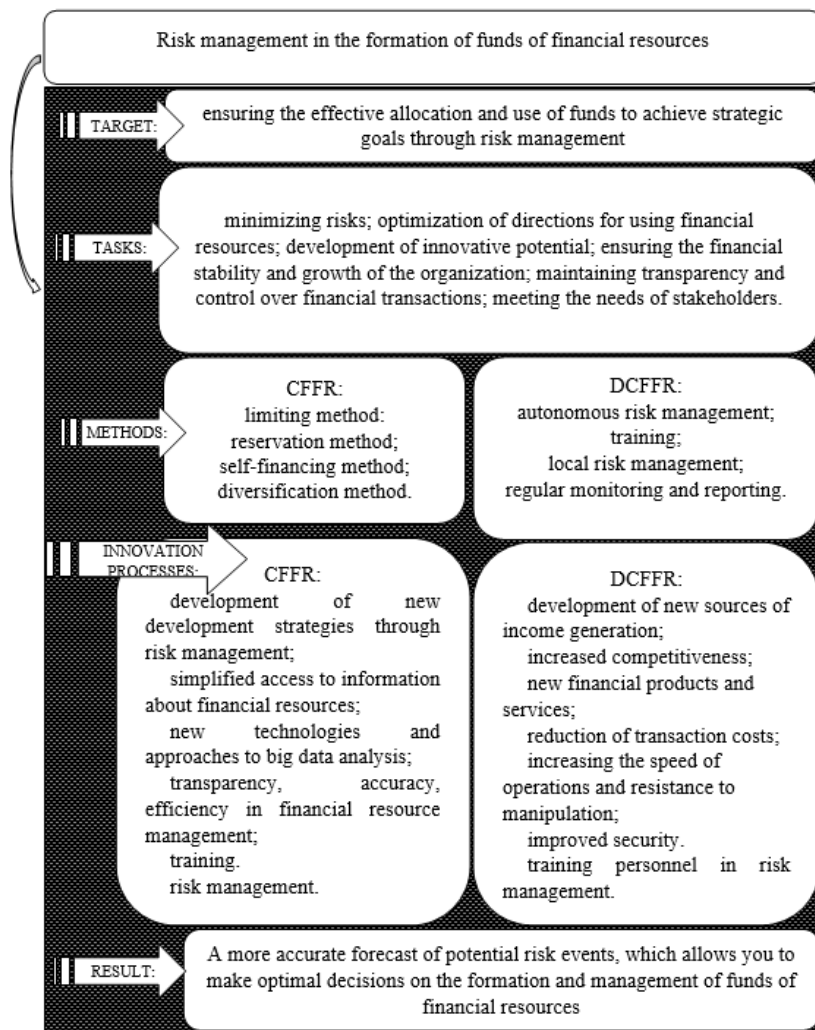


Figure 1. Risk management algorithm when forming funds of financial resources

Requirements for personnel when managing the risks of forming funds of financial resources include the following:

- personnel must have in-depth knowledge in the field of finance, accounting, risk management, big data analysis and financial resource management;
- It is preferable to have experience in financial management, especially in the field of centralized and decentralized funds;
- personnel must be able to analyze financial and economic data, identify trends and predict potential risks;
- you need to have a good understanding of the legislation, especially in the context of the functioning of centralized and decentralized funds.

Risk management of centralized funds of financial resources also includes a number of methods aimed at minimizing potential losses. Among them, it is advisable to note the following risk management methods:

- limiting method, which is built into the budget process;
- the reservation method used as part of the creation of regional reserve funds;
- self-financing method, when using only the subject's own funds should be used as sources for the formation of centralized funds of financial resources;
- a diversification method used mainly in managing risks arising from the placement of temporarily free funds and debt risks.

These risk management methods can be adapted in accordance with the characteristics of decentralized funds of financial resources and their strategic goals. It is also important to remember that risk management requires constant monitoring and adaptation to the changing conditions of the market economy, which generate potential risk situations.

The allocation of financial resources between centralized and decentralized funds of financial resources, taking into account the risk factor, depends on various circumstances, including investment processes, management strategies, expected returns and potentially acceptable levels of risk.

When managing the development of centralized and decentralized funds of financial resources, it is advisable to pay special attention not only to the current internal situation in the state, but it is also necessary to take into account the foreign policy situation, this is especially important in the conditions of sanctions pressure to which the Russian Federation is currently subjected.

Summarizing the above, risk management in the formation of financial resources funds includes several key aspects that can be defined as follows:

- strategy development – it is important to define goals and priorities for managing funds of financial resources, including centralized and decentralized instruments, which includes developing an asset allocation strategy, risk management and establishing financial management procedures;

- regulation and compliance with the legal framework - management of centralized and decentralized funds of financial resources requires compliance with legislation and other regulatory legal requirements;
- risk management – managing funds of financial resources involves assessing and managing risks associated with both centralized and decentralized instruments, which includes developing security strategies, portfolio diversification and monitoring market conditions;
- education and communications – staff and stakeholders need to be educated regarding the emergence of new technologies and approaches to managing centralized and decentralized funds of financial resources.
- In general, managing the risk of forming centralized and decentralized funds of financial resources requires an integrated approach that takes into account technological, regulatory, educational and communication aspects.

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在不断变化的地缘政治和经济格局中实施贸易数字创新
**IMPLEMENTATION OF DIGITAL INNOVATIONS IN TRADE IN A
CHANGING GEOPOLITICAL AND ECONOMIC LANDSCAPE**

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注解。 本文分析了贸易中实施数字创新的具体细节。 在市场条件不断变化的背景下，数字化提高贸易企业发展可持续性的可能性已经被确定。值得注意的是，数字化创新的运用将提高公司的盈利能力，并在消费者之间建立高度的信任。

关键词：数字化、贸易企业、外部冲击、可持续发展。

Annotation. The article analyzes the specifics of implementation of digital innovations in trade. The possibilities of digitalization to increase the sustainability of the development of trading enterprises in the context of constantly changing market conditions have been identified. It is noted that the use of digital innovation will increase the company's profitability and create a high level of trust among consumers.

Keywords: digitalization, trading enterprises, external shocks, sustainable development.

The introduction of digital innovations in the field of trade is carried out quite rapidly. Today it is impossible to imagine the existence of companies without the use of information technologies, since they are the fastest way to improve the quality of service, increase the efficiency of trade processes and thereby gain consumer trust.

V.B. Anfinogenov points out that the specificity of enterprises in this area is that it is impossible to automate only the trading process; in addition, automation tools should be introduced into its basic and management functions, which is what digital innovations do [1].

The purpose of this work is to determine the basic digital innovations in the field of trade enterprises.

The hypothesis of our research is that the implementation of digital innovations in the activities of trading companies helps to increase its efficiency.

There are a number of prerequisites that influence the investment decisions of firms in favor of digital innovation [2]:

1. Consumer behavior. In the context of the worldwide development of the Internet (the emergence of new social networks, marketplaces), the population is increasingly beginning to prefer online trading or a mixed format, which implies the opportunity to get acquainted with the company's assortment on the website and purchase goods in the store. The abundance of businesses allows people to choose and find the best deals. In such a situation, the most successful enterprise will be the one that can most quickly respond to changing consumer behavior, satisfy its needs, and also promote itself using marketing tools. It is digital innovations, for example, targeted advertising as one of the most effective ways of promotion on social networks, that will become a catalyst for development in the field of trade.

2. Deliveries. Trade is inextricably linked with the delivery of products, and the faster and better it is carried out, the more goods will be purchased and the higher consumer loyalty will be. The analysis of this aspect of trade must be approached comprehensively and systematically, since it is important not only to choose a reliable delivery operator, but also to provide the consumer with the opportunity to register it and pick up the product.

3. Competition. One of the main tasks of any commercial enterprise is to gain a competitive advantage. Currently, the leading advantages of companies are considered to be possession of up-to-date information and innovation. The company that will have up-to-date information about changing consumer preferences, the emergence of new technologies and that will introduce new products faster will be the market leader.

4. External factors (pandemic and political situation). They cause uncertainty both in the economy as a whole and in each of its areas in particular. Such a situation cannot be predicted, but it can be assessed using various innovative forecasting tools and, taking into account all possible outcomes, a strategic plan for the development of the enterprise can be drawn up.

The positive effects of introducing digital innovation include:

1. Increasing customer loyalty. Digital technologies make it possible to conduct more thorough and in-depth consumer analysis. Thus, thanks to Data Mining tools or neural networks, it is possible to create a portrait of the target audience of a retail facility. This, in turn, will allow us to create an offer taking into account the demographic characteristics of consumers and their preferences and interests, that is, to create an individualized offer.

2. The emergence of new formats of services provided and methods of digital interaction with consumers [3]. Thanks to the introduction of digital innovations, the concept of digital services has emerged. For enterprises, the provision of digital services is a catalyst for sales and profit growth, respectively. The main ones

include online trading, which is growing more and more on the Russian market every year. Thus, according to a study by the Association of Internet Trade Companies and Sberbank, in 2021 the volume of online trade in Russia increased by 13% and amounted to 3.6 trillion rubles. 1.

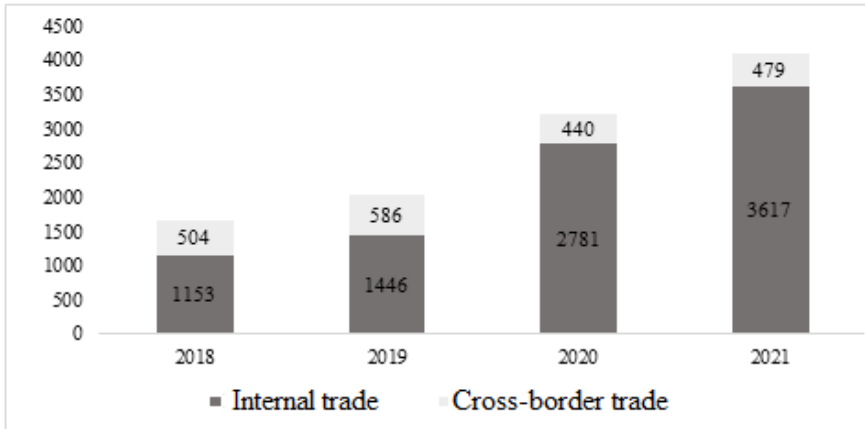


Figure 1. Dynamics of the Russian online trading market, billion rubles.

In addition, many new ways of communicating with customers have appeared: mailings, websites, targeted advertising, social networks - and much more, which allows the company to remind itself more often and quickly communicate about a product or service [4].

3. Increased labor productivity. Indeed, due to the use of innovations that make it possible to work with clients via the Internet, labor costs are reduced compared to traditional methods of communication. And the use of online and offline formats in trade allows us to sell even more products in real time, as well as develop multi-channel interactions [5].

4. Development of new competencies among employees. Today, many companies prefer investing in human capital. It is important to note that this concept has evolved, and enterprises, and especially retail enterprises, as they interact directly with consumers (B2C), are looking not just for qualified specialists, but for employees with innovative and creative thinking. However, the development of such competence is impossible without digital innovation, and it is they that allow it to be developed, which will subsequently have a beneficial impact on the company's performance [6].

5. Optimization of internal and external business processes (business process reengineering). The process approach in the field of trade allows you to increase

sales efficiency. In particular, logistics in trade enterprises is a guarantee of potential profits, since any stagnation leads to lost profits; this problem is solved by introducing an electronic warehouse logistics system [7].

6. Increased level of cybersecurity. Through the use of various Data Mining tools and artificial intelligence, fraudulent activities can be prevented, which will further ensure consumer confidence.

7. Low costs of searching for information. Obtaining up-to-date information in the fastest way is a competitive advantage for companies. But its abundance when using traditional methods of data analysis requires quite a lot of time. Digital innovations make it possible to process them in real time and provide them to the end consumer. It should be noted that thanks to such opportunities, the client will be able to discover new and little-known products, which will promote the development of trade and the emergence of new businesses.

Conclusions. The introduction of digital innovation is one of the key activities of trading enterprises in the face of constantly changing market conditions. The use of innovative developments allows us to increase the profitability of the company and create a high level of trust among consumers. Also, innovative activity helps to expand the market share occupied by companies.

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医疗犯罪的侦查和刑事诉讼的启动问题

PROBLEMS OF DETECTION OF MEDICAL CRIMES AND INITIATION OF CRIMINAL PROCEEDINGS

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Throughout his life, a person needs medical care. Self-medication is wrong and ineffective, so the population turns to representatives of one of the most ancient and noble professions - medical workers. It is on them that people place their hope when any health problems appear. In this regard, the profession of a medical worker implies enormous moral responsibility, including for the life and health of the patient.

At the same time, as in any other specialty, there are frequent cases of errors in the medical profession. No one has canceled the human factor, and given the workload that medical workers have, along with low wages, some doctors believe that it is quite acceptable to make any mistakes. And here the opinions of scientists on the concept of “medical error” are interesting. For example, A. A. Mokhov and I. N. Mokhova understand medical errors as innocent causing of harm in connection with diagnostic, therapeutic or preventive measures [1, p. 57]. A. V. Kudakov, on the contrary, defines medical error as the choice by a medical worker of methods and means of diagnosis and treatment that are dangerous to the life or health of the patient, caused by ignorance or arrogant disregard of special rules [2, p. 7]. In our opinion, the very term “error” in its content includes only a careless form of guilt, which does not completely reflect the concept of “medical crimes”, which in some cases can be committed intentionally.

Here it is worth dwelling on the concept of “medical crimes,” which has not yet been specifically formulated. Analyzing the above opinions of scientists and the available literature, one can see that different authors use ambiguous concepts of this group of crimes: “defects in the provision of medical care,” “iatrogenic crimes,” “poor medical intervention” [3, 4, 5]. Also, the classification of these crimes into the group of crimes in the healthcare sector seems to be overly voluminous and covers a fairly large social sphere. In this regard, the opinion of A. I. Rarog is interesting, who considers the use of the term “crimes in the field of health

care” to be incorrect, since it has a spatial meaning and covers a certain area of social reality. In this sense, crimes in the field of healthcare can be understood as any crime committed by a representative of the medical profession, even using his official position (rape by a paramedic of an unconscious patient; theft by a doctor of medicines containing narcotic drugs, etc.) [6, P. 818].

As a result, we can conclude that it is logical to designate a group of crimes committed by medical workers with the term “medical crimes”, since this concept covers a special subject - a medical worker, and not only a doctor, but also nursing staff, and the object of the attack, and, in general, the objective side of these illegal acts. Thus, analyzing the concept of “medical crimes” formulated by A. A. Bimbinov, in which by medical crimes he understands socially dangerous acts of medical workers committed in connection with the provision of medical care or its organization, conducting medical examinations, examinations, examinations, sanitary -anti-epidemic measures or activities for organ or tissue transplantation and circulation of blood and its components [7, p. 137], it can be adjusted and medical crimes can be defined as unlawful acts of medical workers providing medical care and related activities that contribute to causing harm, material and moral damage. Thus, the subject composition includes not only doctors who directly provide medical care, but also nursing staff (nurses, orderlies).

Next, we will dwell on the practical issues of identifying medical crimes and the problems of initiating a criminal case based on these facts.

Conflicts between a patient and a doctor arise, first of all, regarding the quality of medical services provided, due to the prevailing opinion on the part of patients that the doctor must provide them with timely and high-quality medical care, regardless of other patients, and not while making mistakes. Doctors, in some cases who have caused any harm to the patient, give their mistake the appearance of a completely natural development of the event. This is done in order to avoid possible moral and legal liability. Based on this attitude towards people, the conclusion arises about the incompetence, corruption and indifference of healthcare workers. Also, the media often highlight cases of inadequate medical care. But, even though the crime is made public, it rarely comes to the initiation of a criminal case and trial, since the field of medicine is a separate “state” in which all medical workers are a single system with its own foundations and its own “medical ethics” “

Relations arising in the field of healthcare are regulated by many branches of law: labor law, civil law, administrative law, criminal law. In the Criminal Code of the Russian Federation there is a chapter on crimes against life, health, freedom and dignity of the individual. Also, the Criminal Code includes provisions on compulsory medical measures, illegal engagement in private medical and pharmaceutical activities, etc.

In addition, there are a number of laws that regulate certain areas of medical activity in more detail. At the same time, it should be noted that medical law is

only at the stage of development, just like the medical code, and the basic legal framework and fundamental legal acts in the field of protecting the health of citizens are clearly not enough. These factors do not contribute to the objective implementation of high-quality and effective lawmaking, especially from the perspective of modern medical law. For this reason, some constituent entities of the Russian Federation adopt regional laws, which in some cases are quite contradictory.

A crime by a medical worker is a socially dangerous, illegal, punishable act that encroaches on the life, health, freedom, honor and dignity of patients or their property. May be intentional or careless, committed by a person engaged in medical activities who has violated the law, moral or professional obligations, causing or capable of causing significant harm to the interests of the rule of law in the field of public health protection, public relations in the field of medical care of the population, resulting in death or serious injury patient, significant material and moral damage.

Analyzing the methods of committing medical crimes, we can classify them into 3 types:

1. Failure to comply means that the medical worker, while on duty, did not do what was required of him. For example, the nurse forgot to follow the doctor's instructions, or the doctor for some reason did not prescribe the necessary examination or treatment.
2. Ignoring. It differs from failure to comply in that the medical worker deliberately did not notice something or did not take due attention. The main criterion for separating these concepts is the presence of precise knowledge by the subject of the manipulations to be performed.
3. Ignorance. As a method of committing a crime by a medical worker, it is very relevant, since recently cases of purchasing documents necessary for work in medical institutions have become more frequent. Every 5 years, a medical worker is required to confirm his professional qualifications, and he first studies for several months and then passes a certification exam. In reality, there are a huge number of organizations where it is easy to buy a certificate. Hence the consequence in the form of ignorance by medical workers of what is necessary to know in their profession. According to one of the leading experts in the field of obstetrics and gynecology, Honored Scientist of the Russian Federation, Professor V. E. Radzinsky, one of the main causes of medical errors today is ignorance [8, p. 69].

The peculiarities of medical crimes include the fact that this category of torts does not have a dynamic process of preparation for committing a crime of a particular type.

The problem of identifying these unlawful acts and initiating a criminal case may be due to the fact that in the conditions of constant development, improve-

ment and complication of diagnostic and treatment methods, the tasks of the investigator regarding resolving issues that arise at various stages of the investigation of crimes committed by medical workers become significantly more complicated. The complexity of methodological support for holding medical workers accountable for causing, among other things, careless harm to the life and health of patients, continues to remain relevant and insufficiently developed. The need to create a methodological framework that would ensure the effective investigation of crimes of this group is due to the fact that with a huge actual flow of criminal cases initiated on the fact of causing harm to the life and health of patients by medical workers, most of them are subsequently terminated due to the lack of *corpus delicti* or the proceedings are suspended for failure to identify the person subject to criminal liability. In addition, the development of forensic aspects for this group of crimes would allow us to avoid many problems at the pre-trial stages and more effectively counter them.

Another problem is that when a criminal case is initiated related to the professional activities of medical workers, doctors suspected or accused of committing a crime, as a rule, completely deny their guilt. Most often, medical workers, in order to relieve themselves of responsibility, try to blame the patient himself for not starting treatment on time, taking medications incorrectly, refusing certain procedures, etc.

As practice shows, the main reason why medical workers do not admit to committing an illegal act is the reluctance to bear responsibility for the crime. Most medical crimes are committed without witnesses and there is no control over medical workers at the time of treatment of the patient, and they try to judge the guilt or innocence of the doctor based on the entries made in the medical history by the doctors themselves. In the event of an unfavorable outcome, in some cases leading to the death of the patient, documents related to a specific patient can be rewritten in favor of the doctor in the shortest possible time, or they can be completely destroyed.

The difficulty of initiating a criminal case and investigating this type of crime lies in the fact that when law enforcement officers identify violations of a doctor, strict measures are often not taken against him, unlike other criminals, due to the fact that the culprit is given very a positive characteristic, indicating that the doctor has recommended himself well for many years, is a candidate or doctor of medical sciences, etc. All this can help create favorable conditions for countering the investigation of medical crimes. In addition, examining the practice, we can say that quite often investigators do not go to the scene of the incident, medical documentation is not immediately confiscated, which makes it possible for suspects to falsify it and enter false information into this documentation. Suspects in these cases are not detained, a preventive measure related to detention is not

chosen, they are not interrogated and are not convicted of the crime “hot on the heels”. The red tape called “investigation” in cases of this nature can last for years with a predetermined result: forensic experts conclude that the doctor is not guilty of committing a crime, and the case is dismissed for lack of an event or corpus delicti, without conducting any investigative actions to expose the perpetrators. And in general, criminal cases are initiated with great delay, as a rule, based on complaints from victims, and not on reports from the administration of the hospital where, for example, a patient died.

When considering the issue of identifying a medical crime based on a specific fact, one cannot help but dwell on forensic medical examination. In most cases, the decision to initiate a criminal case or issue a decision to refuse depends on its results. However, there are often cases when, as part of the verification of a crime report, and then during the preliminary investigation and judicial review, conclusions of forensic medical bureaus appeared, in which the correctness of diagnosis and treatment, medical errors or criminal negligence that led to death were not always deeply analyzed or serious injury to patients, and the suspect was more often characterized as a doctor of the highest qualification category, very experienced and respected. Therefore, both the investigator and the court need to take measures to more reliably protect the rights of patients, for example, ordering a forensic medical examination not in the “local” forensic medical examination bureaus. For example, in the Perm region, they found a solution in that the courts entrust forensic medical examination institutions of federal subordination to conduct forensic medical examinations in this category of cases. As a result, in this area, patients won 80% of cases in claims against medical institutions, which was not observed in the previous, “local” examination [9].

Another distinctive feature of the investigation of medical crimes is that at all stages of the preliminary investigation the investigator must be in constant contact with a medical specialist. In modern realities, this is difficult to implement, given the reluctance of medical workers to admit, analyze and correct the mistakes of themselves and their colleagues, and to provide assistance to justice in bringing the perpetrators to justice.

As a problem in studying the issue of investigating medical crimes, one can name the generally accepted standardization of treatment - compliance with the requirements usually imposed on services of this kind: individual consideration by specialists of specific treatment and diagnostic measures, taking into account the characteristics of the patient’s condition, the course of the disease and other factors. In case of violation of the provisions of a mandatory regulatory legal act establishing the rights of citizens in the field of health care (legislative rights of the patient, social support measures, benefits for additional drug provision, etc.), patients’ complaints are immediately recognized as justified. The analysis becomes

more difficult when the provisions of advisory regulations are not observed. In particular, standards of medical care are advisory and not mandatory.

When initiating a criminal case against a medical worker, two components can be distinguished: firstly, to establish the presence of incorrect provision of medical care and its connection with the harmful consequences that occurred; secondly, it is necessary to build and verify the available versions by ordering and conducting a forensic medical examination and carrying out other investigative actions.

In cases of medical crimes, the subject of evidence can use the possibilities of almost all investigative actions enshrined in the Criminal Procedure Code of the Russian Federation. But the most important evidentiary and forensic value are those that give the investigator the opportunity to identify and study information contained in medical documentation, since documentation is one of the main sources of data on the progress and results of medical care.

Maintaining medical records is a mandatory professional requirement, but many doctors do not take it seriously, and most errors by nursing staff occur due to improper maintenance of medical records and prescription sheets. Therefore, the doctor must reflect not only information that is important for the treatment of the patient, but also that which may be needed by forensic doctors and investigative authorities to investigate offenses. This is indicated by the opinion of some authors of scientific publications. For example, A.V. Tikhomirov wrote in his book that neither excellent mastery of the profession nor impeccable adherence to the provisions of departmental acts or orders exempts a doctor from legal liability if the patient's rights are violated. Therefore, incorrect completion of medical documents entails unpredictable legal consequences [10]. And in this regard, it is worth agreeing with the words of V. A. Obraztsov, who defines a document as a carrier of information recorded on it about purposeful human activity, reflecting any really existing or existing event, phenomenon, etc. [11, p. 155].

Medical documentation mainly reflects the picture of any stage of medical care. Therefore, in this category of crimes, the timely search and seizure of documentation related to a particular case is of great importance for the investigation.

As mentioned earlier, when initiating a criminal case for this category of crimes, forensic medical examination is of great importance, which can answer the question of the severity of harm to health. Based on the notes in the medical history left by the attending physician, the expert entrusted with carrying out this examination can establish the nature of the injury, how long ago it appeared and the instrument with which the injury was caused.

However, it should be noted that giving an opinion by a forensic medical examiner is not always as simple as it seems. Experts quite often encounter the fact that in medical documentation, doctors do not provide a complete description of the course of the disease, symptoms or injuries (for example, only the diagnos-

tic, and not the descriptive nature of the injury by traumatologists and surgeons, when a diagnosis of “incised wound” is made, but is not described in detail size, wound edges, etc.). Because of this, an expert, without sufficient information, may incorrectly establish the mechanism of damage formation. Also, different doctors, observing the same patient, make conflicting diagnoses, when one doctor interprets the wound as chopped, the other believes that the wound is bruised. This also creates difficulties during the examination, since an accurate diagnosis cannot be established due to the lack of description of the signs of damage.

In conclusion, we can say that when identifying and subsequent preliminary investigation in cases of medical crimes, it is necessary not only to correctly determine the goals and objectives of the investigative actions, but also to correctly determine the circle of persons involved in them. Also, as part of the investigation, professional medical activities are examined; accordingly, the investigator is required to have high professional and special training in medical issues, a good base of psychological methods and techniques. In this regard, the question of the specialization of investigators can be raised. In our case, we specialize in investigating crimes committed by medical workers in the performance of their official duties.

In the medical and legal literature there are different interpretations of the concept of “medical crimes,” but they are all united by the fact that they are committed during the provision of medical care to patients and can lead to death or serious injury to people seeking treatment. Research into these crimes and responsibility for them is carried out by legal scholars and medical scientists with a legal education. Only through the joint efforts of the above-mentioned specialists can positive results be achieved in solving and investigating medical crimes, bringing the perpetrators to justice and preventing these torts in the future.

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法院实践及其在俄罗斯联邦司法中的重要性

**COURT PRACTICE AND ITS IMPORTANCE IN THE
ADMINISTRATION OF JUSTICE IN THE RUSSIAN FEDERATION**

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注解。 本文研究了俄罗斯联邦最高法院的法律观点对普通法院处理纠纷的影响问题。

关键词: 法院实践、法院独立原则、法律标准解释、撤销原判程序。

Annotation. *The issues of impact of legal views of the Supreme Court of the Russian Federation on handling disputes in the general courts are studied in the article.*

Keywords: *court practice, principle of independence of courts, interpretation of legal standards, cassation proceedings.*

The content of the court practice was defined by S.N. Bratus' and A.B. Vengerov in 1975 as a specification of legal standards as follows "record and identification of specific aspects of the case that must be brought under the law, and leads to the elaboration of general provisions in judicial practice specifying the rule of law that leads to the process of clarification"¹.

According to the Article 18 of the Constitution of the Russian Federation rights and freedoms of a person and citizen are directly enforceable. They define the sense, content, application of laws, activity of the legislative and executive powers of local governance and are ensured by the judicial system.

The lack of uniform understanding of court practice in the doctrine is demonstrated by various approaches forming the notion of court practice either equal

¹ Sudebnaya praktika v sovetskoj pravovoj sisteme / S.N. Bratus', A.B. Vengerov, I.N. Kuznecov i dr.; pod red. S.N. Bratusya. M., 1975. S. 17.

to concept of precedent or to Higher Courts Plenary Resolutions or to any court ruling broadly. In spite of all plurality of opinions on the issue of the definition of court practice that do exist, there are two main approaches to this issue in modern legal doctrine based on the legal soviet doctrine, namely one can understand the court practice in narrow or a broad sense.

In a broad sense the court practice covers the activity of all judicial bodies as well as the rulings made by these organs without exception. The narrow sense understanding connects only with practical activity of the judicial bodies on making only decisions concerning the legal provisions governing legal relations.

V.S. Nersesyants has pointed that the court practice in all its forms it is not a law-making but law-enforcement as well as law-interpreting activity under the Constitution of the Russian Federation, that can be seen in the principle of separation of powers into legislative, executive and judicial. The Supreme Court's of the Russian Federation clarifications under the Article 126 of the Constitution of the Russian Federation on the subject, sphere and sense have nothing to do with law-making but relate to law-enforcement, administration of justice by the courts, in practice. It is also apparent that these clarifications are only advisory².

In a number of cases a legislator gives to law-enforcement practice the ability to form the specification of legal standards in court activity. In the application of legal standard, the content of the standard itself cannot be modified but it is a scope of this standard (range of relations, subjects and objects fall under this standard) and certain subjective rights and legal obligations of the parties to the legal relations are determined.

Any persistent controversy in court practice may lead to the legal uncertainty.

As a consequence of the principle of independence of courts, their autonomy while decision making may be able to explain the differences in interpretations of the same texts on various levels of the judicial system. Such interpretations shouldn't have the effect of creating the legal uncertainty for the parties to the legal relations when the outcome of the case depends on the mechanism cannot guarantee the consistency of court practice. The ability of the legal system to maintain a stable legal relations and consistency of judicial interpretation have the crucial role for preserving the reliance of the parties of the legal proceedings on administration of justice.

By virtue of Article 2 paragraph 7 (1) of the Federal constitutional law, February 5, 2014, № 3-FCL "On the Supreme Court of the Russian Federation" the Supreme Court of the Russian Federation in order to ensure the uniform implementation of the legislation of the Russian Federation clarifies the issues of the court practice on the basis of its studying and generalization to the courts.

² Nersesyanc V.S. U rossijskikh sudov net pravotvorcheskikh polnomochij // Sudebnaya praktika kak istochnik prava. M., 2000. S. 107 - 111.

It is worth noting that live court practice is found in the decisions of the Supreme Court of the Russian Federation on handling the specific civil cases, namely these law-enforcement views are reflected in reviews of the court practice and Plenary Resolutions of the Supreme Court of the Russian Federation.

In some cases, interpretation by the Supreme Court of the Russian Federation of the legal standards is of fundamental importance whereas it significantly changes the existing court practice.

For example, while handling a cassation appeal of a citizen the Supreme Court of the Russian Federation has indicated that according to Plenary Resolutions paragraph 3 (3) of the Supreme Court of the Russian Federation dated 22 June 2021, № 17 “On the application by courts of the standards of the civil procedural legislation regulating proceedings in the court of cassation instance” the Code of Civil Procedure doesn’t provide for an appellate review of individual court decisions, though they may be appealed in cassation. Consider, for instance, some issues that can be appealed in the court of cassation: rulings of the approval of settlement agreement (Article 153 note 10 paragraph 11 of the Code of Civil Procedure of the Russian Federation), court writ (Article 377 paragraph 2 (1) of the Code of Civil Procedure of the Russian Federation), ruling on challenging the decision on the arbitral tribunal (Article 422 paragraph 5 of the Code of Civil Procedure of the Russian Federation), ruling on issuance of the writ of execution to enforce the decision on the arbitral tribunal or on refusal to grant the writ of execution (Article 427 paragraph 5 of the Code of Civil Procedure of the Russian Federation).

Thus, mentioned above list is not exhaustive and shall not prevent to appeal the ruling on cancellation of default judgment and retrial.

The Supreme Court of the Russian Federation has not agreed with the fact that the Code of Civil Procedure of the Russian Federation does not provide the ability to appeal separately the ruling on cancellation of default judgment pointing that the ruling on cancellation of default judgment and retrial may also be appealable in the Court of Cassation of the general jurisdiction³.

The Supreme Court of the Russian Federation has interpreted the legal standard on the right to cassation appeal against the decisions by a person not previously appealed the court acts in the appellate court.

Handling the cassation appeal of a citizen the Supreme Court of the Russian Federation has indicated Article 3 of the Code of Civil Procedure of the Russian Federation has established that the person concerned may appeal against violated or disputed rights, freedoms or legitimate interests (paragraph 1) in the procedure prescribed by civil proceedings.

In accordance with Article 35 (paragraph 1) of the mentioned above Code, persons participating in the case are entitled to appeal court decisions.

³ Opređenje Sudebnoj kolegii po grazhdanskim delam Verhovnogo Suda Rossijskoj Federacii ot 21 iyunya 2022 g. № 78-KG22-17-K3.<http://www.vsrfr.ru>.

It is clear from the legal standards that the right to legal protection is ensured, inter alia, by the right of persons participating in the case to appeal court decisions.

However, this right is not exercised arbitrarily but in the procedure prescribed by civil proceedings.

Based on the adversarial principle the persons participating in the case persons may dispose of the procedural rights granted by law including the right to appeal a judicial act at their own discretion.

At this point, a person participating in the case can at his own discretion either appeal a court decision or refuse to appeal it.

The principle of equal and adversarial basis for parties is implemented in provisions of civil procedural legislation on the consideration by appellate and cassation courts of general jurisdiction for civil cases within the arguments set out in appeals and cassation complaints, submissions and objections regarding these complaints, submissions (Article 327 note 1 paragraph 1, Article 379 note 6 paragraph 1 of the Code of Civil Procedure of the Russian Federation).

At the same time the appellate and cassation courts by virtue of the direct instructions of the law, may verify court decisions only in the challenged part, however the court of appeal has the right to verify the decision of the first instance court to the fullest extent and the cassation court of general jurisdiction may go beyond the arguments of the cassation appeal only in certain cases in the interests of the rule of law indicating the relevant motives (Article 327 note 1 paragraph 2, Article 379 note 6 paragraph 2 of the Code of Civil Procedure of the Russian Federation).

According to Article 390 note 2 part 1 of the Code of Civil Procedure of the Russian Federation, court decisions that have become enforceable, specified in Article 390 note 4 paragraph 2 of this code shall be appealed to the Judicial Board of the Supreme Court of the Russian Federation by persons participating in the case and other persons, if their rights and legitimate interests are violated by court decisions.

A cassation appeal or submission may be referred to the Judicial Board of the Supreme Court of the Russian Federation, provided that the persons specified in the first paragraph of the given part have come to the end of other methods of appealing the court decision established by the listed code.

On the bases of the above provisions of the law in their entirety, it follows that an appeal to the Judicial Board of the Supreme Court of the Russian Federation for the purpose of reviewing the court decisions that have become enforceable in relation to a person participating in the case, and who is dissatisfied with the adopted court decisions is allowed, provided the previous instances of appeal and cassation on his complaint have not rectified the miscarriage of justice.

In the case considered by the Supreme Court of the Russian Federation, the applicant appealed the court decision neither to the appellate instance nor to the

cassation court of general jurisdiction and as a result these courts did not consider the appeal and the cassation complaint.

Thus, the applicant did not enjoy the right to file a complaint with the appropriate appellate court and the cassation court of general jurisdiction. At the same time, the courts of appeal and cassation did not adjust the decision of the court of the first instance.

Under such circumstances, the applicant's cassation appeal shall be left without consideration on the merits on the basis of Article 390 paragraph 1 and Article 390 note 6 paragraph 1 subparagraph 2 of the Code of Civil Procedure of the Russian Federation⁴.

The Supreme Court of the Russian Federation has examined on the merits the legal norm concerning the appealing court decisions procedure.

Now look at more detail at the ruling of the Supreme Court of the Russian Federation on the procedure for appealing court decisions based on newly discovered circumstances.

Thus, a citizen applied to the court for a review of that ruling in the light of newly discovered circumstances but the district court judge's decision was to refuse to accept his claim and claim to the appeal ruling to leave the said ruling unchanged.

Refusing to accept the application, the judge has referred by analogy to Article 134 paragraph 1 of the Civil Procedure Code of the Russian Federation, has indicated that the applicant was actually asking to review the previously adopted judicial acts, citing their illegality and without any newly discovered circumstances. Although, the review procedure of court decisions based on arguments about their illegality is regulated by Chapters 39 and 40 of the Civil Procedure Code of the Russian Federation and cannot be implemented in the procedural form chosen by the applicant. In addition, the court has indicated that the ruling of the appellate court is not subject to review in the manner prescribed by Chapter 42 of the Civil Procedure Code of the Russian Federation by the court of first instance. The courts of appeal and cassation have agreed with these conclusions. The Supreme Court of the Russian Federation has not agreed with the conclusions of the lower courts, pointing out that in accordance with Article 46 paragraph 1 of the Constitution of the Russian Federation, everyone is guaranteed judicial protection of their rights and freedoms.

By virtue of Article 56 paragraph 3 of the Constitution of the Russian Federation, the rights and freedoms under Article 46 of the Constitution of the Russian Federation are not subject to restrictions.

Article 134 paragraph 1(1) of the Civil Procedure Code of the Russian Federation enshrines that a judge refuses to accept a statement of claim if the statement

⁴ Opređenje Sudebnog kollegij po grazhdanskim delam Verhovnogo Suda Rossijskoj Federacii ot 8 iyunya 2021 g. № 18-KG21-26-K4.<http://www.vsrfr.ru>.

is subject to consideration in constitutional or criminal proceedings, proceedings in cases of administrative offenses, or is not subject to consideration in the courts; the application was submitted in defense of the rights, freedoms or legitimate interests of another person by a state authority, local government body, organization or citizen who is not entitled to do this by the code or other federal laws; in an application filed on one's own behalf, the acts that do not affect the rights, freedoms or legitimate interests of the applicant are contested.

According to Article 392 paragraph 1 of the mentioned Code, the court decisions that have come into effect, can be reviewed based on newly discovered or new circumstances.

Article 396 of the Code stipulates that the court considers an application, a motion to review the court decisions based on newly discovered or new circumstances at a court hearing.

The court, having considered the application, the proposal to review court decisions based on newly discovered or new circumstances, grants the application and cancels the court decisions or refuses to review them (Article 397 paragraph 1 of the Civil Procedure Code of the Russian Federation).

As it was clarified in the Resolution of the Plenary of the Supreme Court of the Russian Federation dated December 11, 2012 № 31 “On the application of the norms of the Civil Procedure Code of the Russian Federation when considering applications, submissions for review of court decisions that have entered into legal force based on newly discovered or new circumstances,” consideration of applications, proposals for the revision of court decisions that have come into force are carried out according to the rules of proceedings in the court of the appropriate instance, taking into account the provisions of Chapter 42 of the Civil Procedure Code of the Russian Federation.

In accordance with Article 396 of the Civil Procedure Code of the Russian Federation, the court considers the specified application, presentation at the court hearing; examines the evidence submitted to confirm the presence of newly discovered or new circumstances in the case; listens to the explanations of the persons involved in the case; performs other necessary procedural actions that must be recorded in the minutes of the court hearing (paragraph 6).

In indent two of paragraph 1 of the same Resolution it is explained that the rulings of the courts which do not resolve the case on the merits, can be revised if they exclude the possibility of further case proceeding (Article 1 paragraph 4, Article 331 paragraph 1 (2) of the Civil Procedure Code of the Russian Federation).

The above provisions of the law and the clarifications of the Plenary of the Supreme Court of the Russian Federation imply that the presence or absence of newly discovered or new circumstances is established by the court when making decision regarding the application on the merits, and the law does not provide for

the possibility of rejection to accept an application based on the absence of such circumstances⁵.

Thus, the Supreme Court of the Russian Federation drew the attention of courts to the need to consider abovementioned applications on the merits.

An entire analysis of court practice allows us to assert that the rulings of the Supreme Court of the Russian Federation significantly affect the formation of judicial practice, allow law enforcement officials to interpret the law properly and the courts to avoid miscarriage of justice in considering disputes.

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⁵ *Opredelenie Sudebnoj kollegii po grazhdanskim delam Verhovnogo Suda Rossijskoj Federacii ot 17 maya 2022 g. № 1-KG22-3-K3.<http://www.vsrfr.ru>.*

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现代思想家的教义中, 财产关系是君主和国家安全的一个因素
**PROPERTY RELATIONS AS A FACTOR FOR THE SECURITY OF
THE MONARCH AND THE STATE IN THE TEACHINGS OF THE
MODERN THINKERS**

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注解。 人类的整个历史都与财产的占有及其分配问题有关, 在解决这个问题时, 国家的形成发挥着重要作用。 统治者和国家的生存能力不仅取决于资源潜力, 还取决于民众对他们的态度。 在战争和国家内部冲突中, 诞生了人人平等和正义的思想, 其代言人之一就是新时代的启蒙者。 作者运用描述、分析和概括的方法, 强调了财产关系对财产关系的影响。 国家内部政治稳定。 结论: 财产所有权问题始终是在私人利益和公共利益的交叉点上解决的; 随着时间的推移, 关于强制转让财产的通常观念开始得到正式的法律表述; 众所周知的教义中阐述了公平分配利益的思想, 这些教义承认个人的自然权利受到保护, 免受来自国家的生命威胁; 一个人的权利可以构成人民和社会改变权力的权利的基础。

关键词: 权力、国家地位、没收、法律理念、公共利益、自己、正义、私人利益。

Annotation. The entire history of mankind is connected with the problem of possession of property and their distribution, in the solution of which the role of state formations is significant. The viability of the rulers and States was determined not only by the resource potential but also by the attitude of the population towards them. In wars and intrastate conflicts, ideas of equality of people and justice were born, one of the spokesmen of which were the Enlighteners of the New Age. Using methods of description, analysis and generalization, the author emphasizes the factor influence of property relations on the internal political stability of countries. Conclusions: the issue of property ownership has always been resolved at the intersection of private and public interests; the usual ideas about the forceful method of alienating property began to receive a formal legal expression over time; the ideas of a fair distribution of benefits were set forth in well-known teachings that recognized the natural rights of a person to be protected from threats to his life emanating from the state; the right of one could form the basis of the right of the population, of society to change power.

Keywords: *power, statehood, confiscation, legal idea, public interest, own, justice, private interest.*

The history of Europe is rich in examples of confiscation measures, including those that go beyond, if not the law, then the elitist ideas about their acceptability. The main part of the population during the formation of monarchies and later did not have the opportunity to declare their interests or participate in relations of a state-political nature.

For example, during the Middle Ages, after the conquest of England, William I (crowned in 1066) carried out confiscations of existing possessions, transferring them to his associates and partially appropriating them: “almost all the land holdings of the Anglo-Saxons actually passed through the hands of the Conqueror - either by direct armed seizure, or as a result of confiscations...» [11, p. 10]. At the beginning of the 13th century. John the Landless, through taxes and confiscation of church property, turned both the barony and the Vatican against himself, which resulted in his forced signing of the Magna Carta, which limited the power of the king and prohibited the seizure of land as long as there was enough movable property to pay the debt (§ 9), alienation of property or the goods of free people and merchants who are subject to fines (§ 20), to take property from someone (horses, carts, timber) without immediate payment for it or voluntary consent to this or to defer payment (§§ 28, 30, 31), and also obliged the king to return lands and castles to those from whom they had been taken without legal sentences (§§ 52, 56).

This is the first act that determined the right of the monarch to alienate the property of vassals by law and by an act of authority corresponding to this law. We present the Russian and original (Latin) texts of § 39 of this document according to D.M. Petrushevsky (the first translation of this act appeared in 1903 and was later cited in other publications [7, p. 106; 7, 8, 9]: “Not a single free person will be arrested and imprisoned or deprived of property, or declared to be outside law, or expelled, or in any other way dispossessed, and we will not go against him or send against him except by the lawful verdict of his equals and according to the law of the country» (nullus liber homo capiatur, vel imprisonetur, aut dissaisiatur, aut utlagetur, aut exuletur, aut aliquo modo destruat, nec super eum ibimus, nec super eum mittemus, nisi per legale iudicium parium suorum vel per legem terre” [10, p. 40].

However, the Magna Carta protected the interests of the barons from the sovereign, and in this sense was of an elitist nature, and by a free person the barons “meant first of all themselves, and not the entire free mass among the population of England” [10, p. 41].

The right of force and coercion on the part of the authorities and the state was recognized in many countries, but obvious inequality in living conditions became

intolerable for the masses and the ideas of justice began to be perceived not only in relation to the elite of society. In 1516, T. More (1478-1535) expressed the ideas of the destruction of private property as a condition for the distribution of funds “in an even and fair way” [12, p. 97]. His socialist views consisted in recognizing the priority of public property over private property for the sake of social order: “wherever there is private property, where everything is measured by money, the correct and successful course of public affairs is hardly ever possible” [12, p. 95]; “the distribution of funds in an even and fair manner and well-being in the course of human affairs are possible only with the complete destruction of private property” [12, p. 97]. Connecting the problem of property with the problem of the authority and security of monarchs, Thomas More wrote that the security of the sovereign “lies rather in the welfare of the people than in his own treasury” [13, p. 82], since “whatever the abundance of property, it all goes to a few; and they, dividing it among themselves, leave the rest with one need” [13, p. 90-91].

Recognizing that excessive confiscations lead to rebellion, T. Hobbes (1588-1679) considered the doctrine of the absolute domination of each citizen over what he owns or the right of ownership, excluding the right to the same property of fellow citizens and the state, harmful [1, p. 389, 394]. The thinker’s reasoning clearly expresses the idea of equality between people and the idea of the injustice of laws: “... all people are equal by nature, the inequality that exists today was created by civil law” [1, p. 288]. However, T. Hobbes was a realist and talked about two options for relations between people - relations of hostility and relations of alliance. From the recognition of natural human rights, including the right to self-preservation (the basis is the desire of everyone, to the best of their ability, to protect their own life and body), the scientist follows recognition of another natural right - the right to use all means and methods of ensuring self-preservation (the right to action), which corresponds to the right to evaluate someone’s decisions from the point of view of personal safety (the right to motivation) [1, p. 289-290]. These subjective messages of a natural nature are transformed into the idea that “Nature has given everyone the right to everything” [1, p. 290], what is the basis for the natural right of a person “to govern and command those who are unable to resist” [1, p. 292]. T. Hobbes presented relations between people in a simplified form as an “eternal war”, conditioned by the equality of the combatants, in which a person can exercise the right to rule the weak only if he is a winner, for “omnipotence, by its very essence, directly has the right to any action” [1, p. 291-292]. At the same time, it denoted another way of organizing people’s lives - “to seek peace,” which allows “to hope for long-term security” [1, p. 292] and requiring not to forget about “protection from the enemy” [1, p. 293, 316]. This choice, which presupposes a paternalistic approach to ensuring the well-being of the masses, was, as a rule, declared, since rulers most often expected troubles from

their immediate environment, and history provides us with many facts of violent actions and the overthrow of individual rulers by the masses in monarchical state formations (revolutionary events in England XVII century, in France at the end of the XVIII century, in Russia in 1917).

Such ideas demonstrate the unequal position of equals (including in terms of quality of life) and encourage the need to resolve this contradiction by force. It seems that the theoretical justification of the class struggle was built taking into account Hobbesian views on freedom and the citizen.

With regard to property, T. Hobbes deduced some laws of human life - the law of abolishing the commonality of all things by establishing differences "between mine and yours" [1, p. 321]. From practical life - the law of using "in common what cannot be divided" [1, p. 324] (in these views the thinker goes back to the heritage of Roman law). However, recognizing the division of rights to property between people, T. Hobbes gave priority rights in relation to property to the supreme power: "individual citizens do not each have their own property, to which none of their fellow citizens has a right, because they are bound by the same laws, but no one has such property to which he would not have the right to have the supreme power, whose orders are the laws themselves, whose will covers the wills of individual citizens and who is installed as the supreme judge over them» [1, p. 343].

From the above theses, it is quite possible to derive an opinion not only about the supremacy of the monarch's will, but also about the possibility of changing the holder of supreme power, who does not necessarily have to be an individual person, and about the possible seizure of private property in favor of the supreme power (nationalization of private property). The explanation is this: a person receives property from the state to which he transferred his right, and therefore "your right of ownership and your property exist only to the extent and as long as the state wants it" [1, p. 395]. In these ideas, the English thinker allowed confiscation measures in relation to private property and the only rule for power is that confiscation should not be too harsh and excessive. In these formulas of T. Hobbes there is no place for the principles of justice in the moral dimension or objective necessity in the context of state needs (public interests), there is no place for both moral foundations and the foundations of legality. These ideas were supplemented by thoughts about four categories of civil goods: "the first is protection from external enemies, the second is the preservation of internal peace, the third is enrichment within limits that do not threaten public safety, the fourth is freedom that does not harm others" [1, p. 402-403]. Then the state must set limits to enrichment, since if society is threatened by excessive enrichment of a certain part of its constituent individuals, then such a state of relations threatens the existence of the state. The general meaning of this thesis goes beyond taxation itself, and public safety can be understood as a public interest.

One of the first interpretations of the term “revolution” (from the Latin *revolutio*) is movement, circulation, rotation (in 1543 it was used by N. Copernicus in his work on the revolution of celestial bodies - “*De revolutionibus orbium caelestium*”). Later, its French origin was recognized - “a complete and, moreover, if not sudden, then at least a very rapid revolution in the entire state and social system of the country, usually accompanied by armed struggle” [15, p. 436-437]. By 1909, it was defined differently: “a radical and rapid revolution in the state and social system of the country, usually accompanied by armed struggle” [4, p. 1168-1169]. It is different from the term “social revolution” disclosed there, which “according to the teachings of socialists, should lead to the transfer of land and instruments of production into the hands of the working masses and to a more equitable distribution of the products of labor between different classes of society” [4, p. 1168-1169]. The new approach took into account the history of alienation of property and allowed for a change in the form of ownership.

The origin of the word “revolution” in its political meaning is the merit of J. Locke, who did not give a definition, but described the features of the revolutionary situation and the expected changes. In the second book of his work “*Two Treatises on Government*” (1689) there are words about the right of people to resist power and return it to society, about revolutions in the English kingdom [2, p. 315-316, 349, 361, 380-384, 392-393, 403-404], and the people, “who are constantly being ill-treated and whose rights are violated, will be ready at the first opportunity to free themselves from the heavy burden that lies on them” [2, p. 392].

According to I.S. Narsky, set out in the section “John Locke and his theoretical system”, J. Locke considered the nation to be the supreme sovereign and if the government (ruler) acts contrary to the law, disregarding the laws, takes away property, disposing of it arbitrarily, then the subjects have the right, using the right to self-defense, rise to violent revolution [2, p. 3-76; With. 63]. In the Brockhaus-Efron dictionary, the authorship of the use of the word “revolution” is given to C. Montesquieu (1689-1755) [15, p. 437], while J. Locke introduced it, in fact, before the birth of this French enlightener.

J. Locke (1632-1704) based his political views on the doctrine of natural law and social contract [2, p. 59]. His goal for the social organization of people is their “desire to peacefully and safely use their property, and the main instrument and means for this are laws” [2, p. 60-61]. The first and fundamental positive law of all states is the establishment of legislative power, and the first and fundamental law to which this legislative power must obey is “the preservation of society and (to the extent that this coincides with the public good) each member of society” [2, With. 61]. Considering the nation to be the supreme sovereign in the state, he believed that if the government (ruler) acts contrary to the current law and perverts the laws or does not take them into account at all (takes away the property of citi-

zens and disposes of it arbitrarily), then the subjects have the right to terminate the agreement with him and by right rise to a violent revolution in self-defense [2, p. 63]. Therefore, the ruler must “with the greatest care ensure that the only reason... for imposing restrictions is considerations of state necessity and the well-being of the people” [3, p. 72]. J. Locke repeatedly, coupled with ideas about the individual property of the majority (in relation to the emerging bourgeoisie [3, pp. 317-319, 328-329, 338], expressed thoughts about common ownership [3, pp. 278, 284], about the limits property [3, pp. 282-283], on compensation for damage “that can be caused to any member of the state” [3, pp. 312-313] by the state itself (by the legislature or an official appointed by it, a judge), on the right to resistance to power [3, pp. 315-316, 349, 361, 380-384, 392-393], about the formation of new societies [3, pp. 384-405], about the idea of the common good and the prerogatives of power [3, pp. 384-405]. 359], about returning power to society [3, pp. 403-404].

From the middle of the 16th century. Europe embarked on the path of revolutionary changes, which became a serious test and lesson for monarchical states and their rulers, in which the forms of government changed, civil wars were fought and the lives of both tens of thousands of people and crowned persons came to an end. Reformation ideas swept the whole of Europe, prompted people to uprisings led by priests, nobles and people from the common people, to socio-political reorganization (power of the people, universal freedom while preserving communal and labor property, education, etc.) [14, With. 151, 162, etc.]. They were preceded by religious ideas about freedom and socio-political movements based on them (“moderne devotie” or “renewed piety” [14, p. 192]) and forms of social life (community-monastic) of the 14th-15th centuries. However, in these bourgeois revolutions (the first - the Netherlands, 1566-1609) property did not lose its importance and those who owned it increased their influence. Property motivated people to acquire the right to own (private interest) and dispose of it, and to enter into power relations. The ideas of the common good (public interest) raised the masses to fight, but did not ensure the masses the achievement of these benefits for a variety of reasons. The bourgeois revolution in England (1640-1660) resulted in a compromise between the bourgeoisie and the nobility and the establishment of a constitutional monarchy [1, p. 6]. In England, forms of protest activity and resistance were suppressed by military means, and only in 1215, with the adoption of the Magna Carta, the first legal restriction of absolute royal power in the matter of forced alienation of property took place. The provisions of this act on the inadmissibility of deprivation of property by illegal means served as the basis for the development at the end of the 19th century. constitutional and other regulatory legal acts of France and the USA, and then other countries.

The founder of French materialism and atheism, Jean Meslier (1664-1729), in his work “Testament,” spoke out against private property, believing that the

source of all social injustices is rooted in it [5, p. 38], and for “an ideal social system in which everything will rest on common property” [5, p. 38]. However The Great French Revolution (1789-1794), having established the alienation of property in favor of the nation, also ended with the redistribution of property in favor of the bourgeoisie and nobility.

According to M.N. Marchenko, it is permissible to talk about a transitional type of state when there is a change in socio-economic formation [6, p. 218].

The entry of a state into a certain transitional state can be associated with both internal and external factors that give rise to a socio-economic crisis, but a change in the type of state is not necessary. Other changes are possible in the context of the typology of states (form of government, political regime, territorial structure), which will be supplemented with such a feature as the form of ownership of the means of production.

Abstracting from the theme of the fate of kings and autocrats, tragic in a number of cases, we note that these examples, with special attention to the peculiarities of state and legal transformations, show the following: in the first case (England), the transition period ended with the preservation of the monarchical form of government with some limitation of royal power and the introduction democratic elements; in the second (France) - a series of changes ended with the approval of a republican form of government and the establishment of democracy. In these countries, revolutionary transformations were associated with the issue of property within the framework of the strengthening bourgeois system (capitalist socio-economic formation), which retained the priority importance of private ownership of the means of production. Another example is the Russian Empire, in which the monarchy collapsed, a republican form of government was established, the beginnings of democracy began to develop, and serious changes in the territorial structure occurred in the process of changing the socio-economic formation to a new one, the key feature of which is socialist ownership of the means of production. As a result, a state of a new formational type arose.

The concepts of social development did not constitute a special subject of attention of rulers until the end of the 18th century, but the evolution of social relations was manifested in the growth of social consciousness, in people's awareness of the ideological basis for expressing a certain common interest related to the quality of life. The works of the above representatives of political and legal thought - T. More, T. Hobbes, J. Locke, J. Meslier, C. Montesquieu - awakened public consciousness, were and are important for the development of both ideas of justice and scientific theories about the state, factor significance for a society of property, etc. From the theory of natural human rights, ideas of equality and freedom developed, which translated the idea of natural rights to society, in relation to which the state organization and power occupied a dominant position, but if it

ignored public interests, they could be rejected by society. The rulers (the state) had the recognized right to coercion, but their security, in turn, was generally determined by the well-being of the subject population and the social efficiency of the existing system of property relations.

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互动课堂结构特征对研究生方法论素养形成的影响
**CHARACTERISTICS OF THE STRUCTURE OF INTERACTIVE
CLASSES IN THE FORMATION OF METHODOLOGICAL
LITERACY OF GRADUATE STUDENTS**

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注解。 根据作者的教学模式,提出了互动课程的结构,用于培养研究生的方法论素养,这是人文和自然科学教学所必需的。 概念部分包括方法、整合类型、方法论途径、方法体系和教育形式,它们作为以整合形式构建教育内容和学生发展的装置。

关键词: 方法素养、互动课堂结构、学习模式、知识与方法的整合。

Annotation. *The structure of an interactive lesson is presented, which is used to develop methodological literacy among graduate students, which is necessary when teaching humanities and natural sciences based on the author's teaching model. The conceptual component includes methods, types of integration, methodological approaches, a system of methods and forms of education, which act as installations for constructing the content of education in an integrative form and the development of students.*

Keywords: *methodological literacy, structure of interactive classes, learning model, integration of knowledge and methods.*

To form the methodological literacy of graduate students and students (future teachers), the author's conceptual didactic teaching system (learning model) is used on an integrative and semantic basis. The concept of the learning system is based on the methods, types of integration, principles of learning (scientific, integrative, meaning formation, reflection, and others). The methods and forms of education that initiate integration and meaning formation act as installations for constructing the content of education in an integrative form. Integration strategies include coherence, synectics, and semantic introjection. As well as the types of integration: horizontal, vertical diagonal (Pivovarova, 2009).

The learning model can be applied in educational practice of various academic disciplines and subjects, i.e. it is universal. We have positive teaching experience in teaching biology and biology teaching methods.

The implemented didactic system has the characteristics of an open system object: a structure consisting of interrelated elements (goals, methodological principles, discipline program, methods, teaching tools, meaningful connections with a saturated, active emotional environment) that are in a subordination relationship and form an integrity that is characterized by properties different from those of its parts. According to the laws of synergetics, changing individual elements leads to a change in the entire learning system. For example, the use of interactive (innovative) teaching methods that develop any universal competencies among university graduates increases their professionalism, motivation, changes the Self-concept and even the structure and goals of teaching practice. The combination of traditional and innovative teaching methods and techniques creates not only an integrative content context, but also methodological tools.

The first stage of creating a didactic learning system based on an integrative semantic approach was to study the problem field in the biological education and methodological training of students on the basis of literary sources and our own monitoring (Pasechnik 2003; Selevko G.K. 2006; Pivovarova L.V. 2007, 2021). This stage made it possible to highlight all the strengths and weaknesses in the content of biological disciplines and their teaching methods, rather than working in the dark. After all, it is known that if “a blind man leads a blind man, then both of them will fall into a pit” (Matthew 15:14).

In our opinion, the definition of the concept (an element of a didactic system) developed by the author is important “methodical literacy”, it reveals its semantic essence and determines the direction of the methodical activity of the teacher and researcher. Methodological literacy is the ability to develop and use an integrated system of knowledge and competencies aimed at productive professional and pedagogical activity, adaptation to situational changes in the educational system and society.

The model of methodological literacy development is based on several modern and traditional teaching principles, among them, the principles of integrativity, meaning formation, reflection and others. It includes an interdisciplinary Program in terms of content, a system of traditional and innovative techniques and methods, organizational forms and learning tools, lesson scenarios, and is carried out in an active, creative educational environment. The functions of the practical part of the Program are related to obtaining and consolidating situational experience in the application of knowledge, as well as their use in mastering new knowledge and developing competencies. The practical part also consists of classes using all teaching methods, the core of which are interactive methods, including trainings.

Theoretical training and the practice of mastering technology are inextricably linked in time.

The constructed system of methods of the integrative learning model allows students to carry out several types of activities: informational, organizational, collective, creative, cognitive. Around the system-forming idea, the formation of methodological literacy, complementary methods, teaching techniques (logical, organizational, technical), forms and means of teaching were integrated into the holistic structure of the lesson.

Due to this, training is carried out in the zone of the closest development of students. In other words, it takes students into a zone of discomfort, this condition contributes to the development of their competencies and abilities.

A characteristic feature of classes on an integrative basis are intrasubject, inter-subject and metasubject cognitive tasks that may have different goals: ● explanation of cause-effect and network patterns; ● introduction to the teaching methodology of concepts known from other academic disciplines and others.

The organizational forms of teaching the didactic model on an integrative basis, which were used in the forming of the methodological literacy (FML) process, are classified according to several criteria: 1) classroom work and extracurricular (homework); 2) by the number of students (collective, group, individual); by the duration of training sessions (90, 180 minutes).

The advantage of such training is that it allows students to immerse themselves in the context of their future professional field. This learning process is situationally successful and motivating.

The structure of classes of the learning model reflects a set of different options for interactions between the elements of an interactive lesson that arises in the learning process and ensures its purposeful effectiveness. The formation of the structure of classes in the learning model depended on specific educational tasks, the theoretical content of the educational discipline. FML classes differ in the combination of teaching methods used, a greater degree of independence in cognitive activity and the use of group work of students, solve a greater number of educational tasks. Classes using the learning model were structurally modified by us depending on the achieved goal. The structural elements of classes (intellectual warm-up, lecture / explanation, generalization, tasks for the application of knowledge, selection of keywords, etc.) in the formation of methodological literacy interpenetrate, functionally support each other and enhance the intellectual activity of students, their interest, and, consequently, effectiveness and success in achieving the goal (Fig. 1). In the classroom, new knowledge is simultaneously mastered, consolidated and gained experience in using it in a creative situation. We believe that, if we adhere to the traditional typology, most of the FML classes can be attributed to the type of synthetic ones with a pronounced motivating, ideological and developmental emphasis. The number of structural elements in

the classes may vary. Each methodical scheme of the lesson is tied to a specific topic and learning goal. Using a two-hour academic lesson allows you to devote 30-50% of the study time to group and individual work for the development of competencies, functional and systemic literacy, and methods of action. Thus, in terms of the number of tasks to be solved, such classes can be called multifunctional, and in terms of the approach to choosing the technologies used, they can be called complex classes.

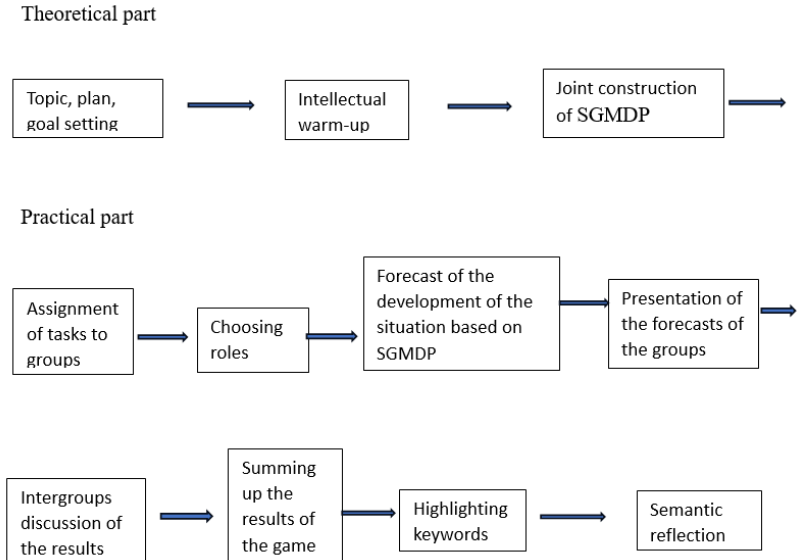


Figure 1. The structure of the lesson on an integrative basis using the methods of semantic graphical modeling of the development of processes (SGMDP) and elements of gaming activity.

Figure 1 shows an example of the schematic structure of the scenario of an interactive lesson on an integrative basis, the topic of which is “Forecasting learning achievements based on a productive paradigm”. The purpose of the lesson: the development of methods aimed at the development of systematic methodological literacy.

The lesson scenario is developed by the teacher. As evidenced by the lesson structure diagram, interactive methods and techniques were used, such as semantic graphical modeling of process development (SGMDP), intellectual warm-up, elements of role-playing, discussions, formulation of problematic issues, development of activity communication. Together, they implement the principles of

integrativity of the content and methods of education, meaning formation, and productivity.

The scenario includes:

- formulation of the lesson topic;
- the purpose and objectives of the lesson;
- description of the task and intellectual warm-up;
- a brief description of the methodology of the first part of the lesson (theoretical) with an explanation of the use of the SGMDP method; questions of different cognitive levels.

• The practical part of the scenario is aimed at modeling the forecast of the development of productive learning. It includes a brief description of the methods and techniques used, types of questions, organizational forms, and learning tools. It is carried out with the independent or group use of the SGMDP method, elements of discussion and role-playing, posing different types of questions.

In addition, training is being carried out:

- methodological instructions or rules for students' participation in the game,
- a list of handouts, • approximate conclusions are being developed that students can approach at the end of the game activity, • questions for the stage of reflection and preparation of a report by group work participants,

- Additional sources of information. The time of completion and the form of presentation of the results (written or oral), as well as the type (report, table, diagram, presentation) are calculated. The distribution of participants into groups is made in advance.

We believe that improving the methodology of teaching disciplines, as an element of the learning system, at any level of education, both school and university, will invariably lead to an improvement in the education system as a whole.

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工业4.0背景下的技术教师培训
**TECHNOLOGY TEACHER TRAINING IN THE CONTEXT OF
INDUSTRY 4.0**

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注解。 本文概述了工业 4.0 的现代工业技术,并考虑了它们对整个教育系统发展的影响,特别是对学校和大学的技术教育的影响。 这些技术中最重要的包括: 物联网; 添加剂制造; 人工智能、机器学习和机器人技术; 大数据、区块链、云计算; 虚拟和增强现实。 工业 4.0 技术在技术教育中的使用是相关的,并且需要将这些技术纳入教育过程的方法。

关键词: 第四次工业革命、工业4.0、数字技术、技术教育。

Annotation. *The article provides an overview of modern industrial technologies of Industry 4.0, which are considered in the context of their influence on the development of the education system as a whole, and especially on technological education at school and university. The most important of these technologies include: Internet of things; additive manufacturing; artificial intelligence, machine learning and robotics; big data, block-chain and cloud computing; virtual and augmented reality. The use of Industry 4.0 technologies in technological education is relevant and methods for incorporating these technologies into the educational process are needed.*

Keywords: *fourth industrial revolution, Industry 4.0, digital technologies, technological education.*

The development of new technologies and their dissemination into modern production, the economy, the social sphere and education are currently occurring at an unprecedented speed. The rapid development of technology will lead in the coming years to the formation of completely new markets that will provide consumers with advanced technological solutions and fundamentally new services. We can talk about the currently unfolding global industrial revolution, which is the result of recent advances in the field of digital technology [1].

The main directions of Industry 4.0 are advanced technologies, thanks to which the fourth industrial revolution has become a reality. The most important of

these technologies include [2, 3]: Internet of things; additive manufacturing; artificial intelligence, machine learning and robotics; big data, block-chain and cloud computing; virtual and augmented reality.

The Internet of Things is a cloud environment that unites devices, instruments and entire technological systems equipped with means of interaction with each other or with the external environment into a single managed network. The Internet of Things is restructuring technological, organizational and even social processes, excluding human participation from their management. Internet of Things technologies significantly expand the possibilities of distance learning in education. Sensors, instruments, laboratory installations and entire laboratories connected to the Internet make it possible to organize remote distance learning classes using real, not virtual, equipment.

Additive manufacturing is the process of creating tangible objects from digital models. A three-dimensional model is created in a computer-aided design system, after which the model goes through the stage of dividing the model into elementary 2D layers and the result is sent to a 3D printer. The areas of application of 3D printing are practically unlimited at present. 3D printers are used in construction, medicine, education, architecture, design, marketing, advertising, automotive industry, clothing and footwear modeling, archeology, and the jewelry industry. Additive technologies are being actively introduced into technological education. Consideration of these technologies is also provided for in the Approximate Basic Educational Program of Basic General Education. These technologies are also used in additional education for the manufacture of individual elements of various technical devices and robots.

Artificial intelligence is a section of the complex of computer sciences, the main task of which is to create computing systems capable of performing creative functions that are traditionally considered feasible only by humans. The main areas of research in the field of artificial intelligence are: robotics, image, character, speech recognition systems, machine learning. Advances in the field of artificial intelligence have made it possible to outline a currently formative section in pedagogy - robotic-pedagogy. The main tasks of this area are the design and use of artificial intelligence technologies in the educational process, such as virtual teaching assistants - avatars and chat-bots.

Big data is a technology for processing huge volumes of information. When talking about big data, one should take into account not only large volumes, but high speeds of receiving, transmitting and processing information, as well as a wide variety of types and formats of data. Processing large amounts of information from educational systems, analyzing the learning outcome and behavioral characteristics of students will make it possible to create individual educational routes, which is currently extremely relevant.

Virtual and augmented reality. Virtual reality is a technology in which the control object is a computer model of reality. Augmented reality is a technology that allows you to conduct an experiment by perceiving mixed reality, i.e. The user perceives, in addition to real objects, information created using virtual model elements “augmented” using a computer. Virtual and augmented realities are technologies that will be effectively used, including in distance learning, allowing us to expand the capabilities of modern education. Based on these technologies, simulation laboratory stands and laboratory installations with elements of augmented reality are created.

Advanced technologies are already reflected in the training of future teachers of technology, physics, computer science, and teachers of additional education. Thus, at the Moscow Pedagogical State University, the following disciplines have been introduced into the educational program for training teachers of technology and physics: Educational robotics, Lego mechanics, Mobile device programming, 3D design, 3D modeling. The training program for teachers of computer science and technology at Moscow City Pedagogical University includes modern disciplines: Computer modeling, Fundamentals of artificial intelligence, Fundamentals of educational robotics, Fundamentals of working in CAD systems, Fundamentals of mechatronics and robotics, Cloud technologies in project activities. At Syktyvkar State University named after Pitirim Sorokin, when training teachers of physics and technology, students study disciplines such as: Mechatronics and mobile robotics, Automation and microprocessor technology, Microcontroller programming, 3D modeling. And similar disciplines are being introduced in other pedagogical universities.

The educational programs of 34 universities implementing technological education programs were analyzed [4]. In the educational programs reviewed, disciplines related to five areas of modern industrial digital technologies were highlighted: robotics, automation; internet of things, microcontroller programming; 3D modeling, CAD; big data, cloud technologies; virtual and augmented reality, computer modeling. The results of the study are presented in Fig. 1.

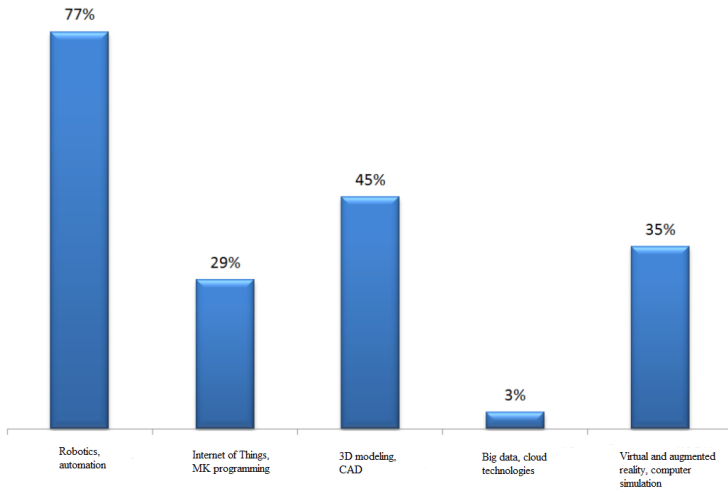


Figure 1. Number of universities (in %) implementing disciplines related to digital technologies in their undergraduate technological education programs

The analysis showed that disciplines related to Industry 4.0 technologies are included in the curriculum for the training of technology teachers. But the area related to the prospects of artificial intelligence and artificial intelligence technologies are not reflected in educational programs, which require methodological research in this area.

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发展教育是现代教育的趋势
**DEVELOPMENTAL EDUCATION IS A TREND IN MODERN
EDUCATION**

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抽象的。 本文探讨了发展教育作为21世纪教育主导趋势的问题。 目的是分析 K.D. 著作中的发展教育思想。 乌申斯基, 俄罗斯科学教育学创始人。 主要注重揭示学习作为劳动过程的本质及其发展特征。 作者揭示了 K.D. 的想法。 乌申斯基关于动机的形成和教育工作的必要性作为学生发展的基础, 显示了它们对现代教育的意义和相关性。

关键词: 培训、教育、发展、工作、动机、母语、人类学原理、活动方法、实际发展区、最近发展区。

Abstract. *The article examines the problem of developmental education as a leading trend in education in the 21st century. The goal is to analyze the ideas of developmental education in the works of K.D. Ushinsky, the founder of scientific pedagogy in Russia. The main attention is paid to revealing the essence of learning as a labor process and its developmental characteristics. The author reveals the ideas of K.D. Ushinsky about the formation of motivation and the need for educational work as the basis for the development of a student, shows their significance and relevance for modern education.*

Keywords: *training, education, development, work, motivation, native language, anthropological principle, activity approach, zone of actual development, zone of proximal development.*

The goal of education in the information age is the ability of a person to find the necessary information, effectively master huge amounts of new information, analyze it and critically evaluate it, select, apply and act successfully in situations of uncertainty. The dynamism of modern life requires dynamic changes in education. However, the success of educational reforms is inextricably linked with the fundamental foundations of education, the historical and pedagogical heritage, and the creative use of the positive experience of the past.

Continuity and innovation are one of the features of education in a post-industrial society. Today, the younger generation should receive a basic education that

will allow them to develop independently in the future, generally culturally and professionally. At the same time, the era of the 21st century has acutely raised the question of the morality of modern man, about what values he will be guided by when applying the acquired knowledge and developed intellectual abilities. And the solution to this problem lies in the plane of scientific pedagogy and educational practice.

The purpose of the article is to highlight and substantiate the relevance of K.D. Ushinsky's ideas - the founder of scientific pedagogy and the public school of Russia, because this scientist was the first to give a psychological and pedagogical justification for the developmental nature of education.

The foundations of development, the desire for the cognitive process, begin even before the child enters school. But the stage of primary education is especially important, the process of modernization of which is closely related to the implementation of the concept of developmental education in the practice of modern schools. The problem of child development in the process of his initial education and upbringing arose a long time ago and was considered in one aspect or another by all outstanding Russian and foreign teachers of the past.

K. D. Ushinsky was the first to outline this problem in Russian pedagogy in the most profound and comprehensive way in the article "Labor in its mental and educational meaning." Konstantin Dmitrievich revealed the essence of the learning process, considering it as a joint creative work of teacher and student, as a result of which the child, through effort, discovers knowledge himself, and the teacher provides the help he needs in this. "Learning is work and should remain work, but work full of thought..." [4, p. 14], because labor is the source of human development, its dignity, morality and happiness. One of the leading principles of K.D. Ushinsky's pedagogy is anthropological has not lost its significance today and is organically connected with the activity approach in education. "The basic law of children's nature can be expressed this way: a child demands activity incessantly and gets tired not of activity, but of its monotony and one-sidedness" [3, p. 158]. Human development occurs only in activity, in which the child expresses himself, tries his strength, reflects social reality, acquires knowledge, experience, and mental developments.

Revealing the pedagogical essence of the native language, K.D. Ushinsky calls him a "people's mentor" because the native language is so rich in content that it clearly explains a lot to a child and is the best interpreter of the surrounding nature and life. The native language teaches, develops, and raises a child, and with extraordinary ease. The place of the native language in the upbringing and education of a child is one of the most important problems of modern education. The peculiarities of the modern era urgently require a person to speak foreign languages. This raises the issue of the role of the native language, the rational relationship between native and foreign languages in the process of teaching and upbringing.

According to K.D. Ushinsky, a child will develop in the learning process if he takes a subject position, which the teacher provides him with. K.D. Ushinsky convincingly showed that educational work (like any other) contributes to the development of a child only when it is free for him, i.e. conscious. "The art of a teacher lies in the fact that she clearly highlights the main idea or the main fact of the lesson..." [5, p. 163]. When preparing for a lesson, the teacher must not only think through the goal, but also present it to the students in an attractive way, and gradually teach children to set their own goals. K.D. Ushinsky convincingly argued that only personal educational work can be developmental, therefore the teacher should not present knowledge in a ready-made form, but encourage the student to discover the truth himself. Academic work must be serious and difficult, because... Only by overcoming obstacles and making efforts can a person develop. That's why K.D. Ushinsky opposed "amusing pedagogy", insisting that "Only the youngest children up to the age of seven can be taught through play, after which science must already take on a serious, characteristic tone" [5, p. 23].

Konstantin Dmitrievich was convinced that learning is developmental in nature if it affects not only the child's intellect, but also his soul, and has an educational character. "Every school must first of all show a person what is most precious in him, forcing him to recognize himself as a particle of the immortal and a living organ of the world spiritual development of humanity. Without this, all factual knowledge... will not only bring no benefit, but also positive harm to the person himself, although, perhaps, they will make him a useful, and sometimes a very harmful machine in the social order" [5, p. 21–22].

K. D. Ushinsky in his works raises an important question about the relationship between the importance of education and training. A developed mind and a wealth of knowledge are not enough for the development of morality in a person, although the learning process itself has an educational effect. Concern for the future of the child should not prioritize education and, moreover, be limited only to it; it is absolutely unacceptable to underestimate targeted educational work in this direction. The teacher wrote this: "... a moral feeling lives for each of us in the same way as the feeling of personality, egoism. But whereas the first, i.e. moral feeling, the noblest and most tender plant of the human soul, requires great care and supervision in order to grow and become stronger, another, like any weeds, ... not curbed in time, soon suppresses all the best, most tender plants" [2, p. 31]. K. D. Ushinsky is convinced that moral influence is the main task of education, much more significant than the development of the mind in general, equipping the child with a system of knowledge and showing their practical benefits. This should never be overlooked, especially in such difficult periods as our world is going through today.

Based on criticism of the teaching of his time, K.D. Ushinsky came to the important conclusion that not all training promotes development; it can also hinder

and slow it down. The teacher characterizes the developmental learning process as a type of scientific and cognitive activity that has a two-sided nature. To organize the child's developmental activities during the learning process, K.D. Ushinsky justifies and formulates a number of principles/rules of teaching, which are also implemented by modern didactics: timeliness, gradualism, organicity, consistency, morality (educational character), firmness, feasibility, clarity, initiative, usefulness.

Interesting and significant for modern didactics are the ideas of K.D. Ushinsky about the lesson. Considering that not every lesson contributes to the development of a child, the teacher developed requirements for good, i.e. developmental lesson: the main idea of the lesson should be presented to students in a clear, bright, attractive form (the teacher must think about how to ensure that children take part in setting the goal of the lesson and become its subjects); logical connection of new material with previously studied; activity, interest of students in the lesson (for this it is necessary to be able to use a variety of methods; the teacher considered the ability to activate all students as a criterion of teacher dignity); meaningfulness and strength in mastering new knowledge (an important role was given to independent work, the teacher must teach the child to work independently in class, and only then give homework); discipline and order in the lesson (this is achieved by the art of the teacher to keep the attention of all students in the lesson).

Understanding teaching as work, K.D. Ushinsky, along with the tasks of developing the student's mind and enriching it with useful information, considers it necessary to "ignite in him a thirst for serious work" [5, p. 22], i.e. at the initial stage of learning, to form the need and habit of learning. The student must understand that not everything in learning is easy and interesting; not every useful and necessary knowledge has direct practical application. The habit of studying will help the child successfully cope with the difficulties of learning. Only the formed need and habit of learning will become the basis for independent knowledge of new, continuous self-development. "Possessing such mental strength... a person will study all his life, which, of course, is one of the most important tasks of any school teaching" [1, p. 65].

Article by K.D. Ushinsky is interesting and valuable because in it the author gave well-grounded recommendations for organizing developmental education and forming the need and habit of learning.

1. In order to ignite a child's thirst for serious learning/form motivation, it "first of all must instill in him a serious outlook on life" [5, p. 22]. A child's serious attitude towards learning is determined by the serious attitude towards his activities on the part of other people. It is necessary that "...the parents themselves and all the adults surrounding the child look with respect at his children's efforts..." [5, p. 23].

2. Formation of the habit of learning is possible provided that the learning is feasible for the child. The teacher, when organizing the educational process, must know and rely on the present/real level of child development (the zone of actual development, according to the theory of L.S. Vygotsky), so that "... the pupil has only as much work as his young forces can overcome" [5, p. 24].
3. Developmental educational work is serious and difficult, so it must not only be feasible for the child, but also contain difficulties for him. This is a condition for the formation of the need for learning. Therefore, the teacher's task is "not to teach, but to help learn" [5, p. 24], i.e. help the student overcome difficulties. The main value of this method is creating a situation for success for the child. Coping with difficulties, the child experiences a feeling of satisfaction from the activity being performed, feels his growth, progress, and feels the need to further solve educational problems. Therefore, in an effort to develop a student, a teacher must focus on his zone of proximal development (as will later be proven in the concept according to L.S. Vygotsky).
4. In order for a child to get used to enduring prolonged mental work without harm to health, educational activities for him must be gradual and systematic. "Together with this habit of working mentally, a love for such work is acquired..." [5, p. 24].
5. The formation of the habit and need to learn depends on the correct alternation of the child's activities in the lesson, on the teacher's ability to "keep the attention of all his listeners constantly excited" [4, p. 25], giving the opportunity for rest.
6. In order for the learning process to contribute to the development of each student, the teacher must be able to keep everyone busy in useful activities during the lesson. "Most of all, it is necessary that it becomes impossible for the pupil to spend time as a lackey, when a person is left without work in his hands, without a thought in his head..." [5, p. 25].

Konstantin Dmitrievich believed that the main duty of a teacher is to accustom students to mental work and that "this duty is more important than teaching the subject itself" [5, p. 25].

Despite the global differences in the life and educational requirements of a person in the 19th and 21st centuries, the ideas of K.D. Ushinsky have not lost their relevance for both domestic and foreign education. The origins of developmental education, the ideas that are being implemented today, are rooted in the past, which gives us answers to many questions and meets the challenges of our time. And although today the nature of human labor has changed significantly, it continues to play the role of not only a source of material wealth, but also remains the

most important basis for the comprehensive development and self-actualization of a person, as proved by K.D. Ushinsky. Of lasting importance is the scientist's interpretation of the learning process from the perspective of the activity approach, the setting of tasks that the teacher must solve in each lesson, recommendations, the implementation of which provides the child with conditions for development, which is the key to his success in any historical era, in any conditions.

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电子学习作为评估高等教育全纳教育质量的指标

E-LEARNING AS AN INDICATOR OF ASSESSING THE QUALITY OF INCLUSIVE EDUCATION IN HIGHER EDUCATION

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抽象的。 本文讨论了通过残疾人电子和远程学习等指标来评估大学全纳教育质量的理论方面。 作者重点关注这样一个事实，即全纳教育质量的标准之一是在大学中创建一个利用电子学习和远程教育技术实施教育计划的系统。 此类技术用于实施额外的专业教育计划，为行动不便的人(例如残疾儿童)组织培训，即全纳教育。 与传统学习方法相比，电子学习的使用具有巨大的优势。

关键词: 包容性、培训、电子学习、远程学习技术、教育环境、教师、大学信息和教育环境。

Abstract. *The article discusses the theoretical aspects of assessing the quality of inclusive education at a university through the prism of such an indicator as electronic and distance learning for persons with disabilities. The author focuses on the fact that one of the criteria for the quality of inclusive education is the creation at a university of a system for the implementation of educational programs using e-learning and distance educational technologies. Such technologies are used in the implementation of additional professional educational programs, when organizing training for people with limited mobility (for example, disabled children), i.e. in inclusive education. The use of e-learning has enormous advantages over traditional methods of learning.*

Keywords: *inclusion, training, e-learning, distance learning technologies, educational environment, teachers, information and educational environment of the university.*

The inclusive education system includes educational institutions of secondary, vocational and higher education. Its main areas of work are the creation of

a barrier-free environment in the study and professional training of people with disabilities and limited health capabilities. This is the technical equipment of educational institutions, the development of special training courses for teachers and students, which are aimed at developing their interaction with people with special needs. In such institutions, work is underway on special programs that are aimed at facilitating the process of adaptation of students with disabilities in educational institutions. The adaptation process is most effectively implemented in the process of electronic and distance learning, which is relevant for persons with disabilities. The main criterion for the effectiveness of inclusive vocational education is successful socialization, mastery of culture, development of social experience, professional self-determination of young people, including students with disabilities and limited health capabilities. As a result of the analysis of scientific literature on the issue of introducing inclusion into educational institutions (A.I. Akhmetzyanova, T.V. Artemyeva, O.V. Zinevich, A.T. Kurbanova, L.A. Nagornaya, N.N. Nagorny, I. A. Nigmatullina, L. A. Potylitsyna, A. A. Tvardovskaya, A. T. Faizrahmanova) we determined that it is necessary to evaluate the quality of the process of organizing inclusive education, as well as conventional education, in a comprehensive, systematic manner. One of the criteria for the quality of inclusive education is the creation at a university of a system for the implementation of educational programs using e-learning and distance learning technologies. Such technologies are used in the implementation of additional professional educational programs, when organizing training for people with limited mobility (for example, disabled children), i.e. in inclusive education. The history of the emergence of e-learning is inextricably linked with distance learning, which in turn became widespread at the beginning of the last century, when education could be obtained in absentia, by correspondence, i.e. remotely, without direct interaction with the teacher.

With the development of computer technology, telecommunications and the Internet, distance learning has received a new impetus for development. It has become possible to transmit a large amount of information at a distance, post learning materials on websites and portals on the Internet, which has made education more accessible. Distance learning has come to be understood as a learning process that uses technologies that do not require the direct presence of a teacher - primarily information and communication technologies. In English-language educational literature, the term “open and distance learning” is often used, emphasizing the fact that compared to traditional learning, distance learning is open to a wider audience. Open education does not require entrance exams and is available to anyone; Moreover, it can be “informal” (nonformal, informal learning), i.e. does not end with the receipt of relevant educational documents. It was at this time that e-learning began to develop, which at this stage of development served as a “technically improved form of distance learning” [6].

When implementing educational programs, various educational technologies are used, including distance educational technologies and e-learning [6]. According to the definition given in Art. 16 of the Law on Education, e-learning is understood as the organization of educational activities using information contained in databases and used in the implementation of educational programs and information technologies, technical means, as well as information and telecommunication networks that ensure the transmission of this information via communication lines, ensuring its processing, interaction between students and teaching staff. Distance educational technologies are understood as educational technologies implemented mainly using information and telecommunication networks with indirect (at a distance) interaction between teaching staff and students. Educational institutions must apply such forms of training in accordance with the Law on Education, the Procedure for the use of e-learning by organizations engaged in educational activities, distance educational technologies in the implementation of educational programs, approved by Order of the Ministry of Education and Science of Russia dated January 09, 2014 No. 2 [3]. The use of e-learning has enormous advantages compared to traditional methods of learning, namely:

1. Economic efficiency. Today, many institutes for advanced training, both in our country and abroad, offer distance training and retraining programs for teaching staff. The costs of conducting electronic courses are much lower compared to traditional courses due to the absence of transportation costs, payment of living costs in another city, costs of organizing the courses itself (rent of premises for conducting courses, salaries of service personnel, costs of methodological support of courses, handouts), especially if the courses involve a large number of students.

2. Lack of time and geographical boundaries. The use of e-learning and distance educational technologies implies indirect (at a distance) interaction between students and teaching staff, therefore it can be used when studying individual subjects in rural schools due to the lack of specialists, when receiving self-education and family education, for advanced training without leaving the main field work. At the same time, the information is contained in databases accessible to the student, and he can study new material at any time and place convenient for him. E-learning develops the skills of independent work with the material: you can choose the speed and intensity of training, the number of repetitions of certain modules, and is also very flexible - it can be started and continued at any time.

3. Training according to individual educational programs. An individual training program can be developed for each student, taking into account his mode and need for knowledge. The curriculum can be adapted to the characteristics and needs of all participants in the educational process: from a set of independent training modules, an individual curriculum can be created that will meet individual or group needs. E-learning provides equal educational opportunities regardless of a person's characteristics - health status, place of residence, financial security.

4. Increasing the level of ICT competence and expanding the information studied. When working in a training system, you need to have basic computer skills: go to a browser, find an educational portal or website on the Internet, register, download material, send your answer for verification, etc. The practice of conducting distance learning has shown that the majority of students at the first steps of working in a learning environment experience enormous difficulties due to the lack of computer skills, however, by combining various types of educational information and the use of interactive interaction between the system and the student, these skills are improved. The use of modern means of media didactics - computer graphics, video, animation, sound, etc., makes it possible to make the material being studied more visual and understandable, and therefore memorable.

5. Optimization of the teacher's work. The training system frees the teacher from the functions of a lecturer (transmitter of theoretical information), and there is time for additional individual work with students to improve their own qualifications.

When implementing educational programs using exclusively e-learning and distance learning technologies, conditions must be created in an educational institution for the functioning of an electronic information and educational environment, ensuring that students master educational programs in full, regardless of their location and including (clause 3 of Art. 16 of the Law on Education) [3]: electronic information resources; electronic educational resources; a set of information and telecommunication technologies; appropriate technological environments.

Methodological recommendations for the use of e-learning, distance learning technologies in the implementation of additional professional educational programs, communicated by Letter of the Ministry of Education and Science of Russia dated April 10, 2014 No. 06-381. Based on the existing regulatory framework, an educational institution that uses e-learning and distance learning technologies develops appropriate local regulations that are part of the system of local regulations that ensure its education. With the methods of training under consideration, the place of implementation of educational activities is the location of the institution or its branch, regardless of the location of the students. In addition, educational institutions should be guided by the activities of [3]. According to the requirements of the Federal State Educational Standard, the effectiveness of the educational process must be ensured by the information and educational environment (IEE) - a system of information and educational resources and tools that provide conditions for the implementation of the main educational program of an educational institution. The system-structural organization of IOS is manifested in the fact that it is a set of interacting systems (subsystems): information educational resources, computer teaching aids, modern means of communication, pedagogical

technologies [5]. In e-learning, the formation of an information and educational environment is carried out using a distance learning software system (hereinafter referred to as DLS). Using the distance learning system: curriculum developers: content authors, web designer, programmer, artist, methodologists jointly develop and post meaningful content; the teacher plans his teaching activities: selects from existing ones or creates the simplest resources and tasks necessary for students; school administration, methodological services, educational authorities, teachers, students and their legal representatives can promptly receive complete information about the progress of the educational process, intermediate and final results, thanks to the automatic recording of these positions in the information environment; students complete tasks (get to know each other, collect and organize information, create multimedia educational products, participate in forums, etc.), turn to teachers for help; teachers express their attitude towards students' work in the form of text or audio reviews, moderation of forums, and oral online consultations; students, their legal representatives, teachers, receive additional opportunities for communication within the school community, expressing their opinions, putting forward proposals and initiatives, recording them in the information environment.

An educational information system using e-learning must meet the following requirements: ensure management of the content of education, carry out educational interaction "teacher-student"; ensure transparency of the educational process for the administration, teachers, students, parents, and educational authorities; ensure the formation and adjustment of individual educational plans for students; create an electronic schedule and deliver it to each participant in the educational process through the educational portal; keep records of the results of the educational process in electronic form (portfolio and electronic journal); keep electronic diaries.

It is advisable to improve the qualifications of teachers who intend to carry out e-learning, as well as training using distance educational technologies, using a distance learning system in which teachers will have to work in the future. As a result of training, future teachers should have the necessary knowledge: about the characteristics of the psychophysical development of children belonging to different pedagogical groups; in the field of methods, technologies, approaches to organizing the educational process for children belonging to different pedagogical groups; about specific tools and capabilities that allow technical implementation of the e-learning process.

With e-learning and the use of distance educational technologies, educational organizations provide educational and methodological assistance to students, including in the form of remote individual consultations, using information and telecommunication technologies [5].

The institution independently determines the volume of the classroom load and the ratio of the volume of classes conducted through direct interaction between the

teaching staff and the student, and classes using e-learning and distance learning technologies.

With such training, the absence of classroom training is allowed, which makes such training accessible to people with special health needs. Educational institutions must provide a level of training appropriate to the technologies used for pedagogical, scientific, educational support, administrative and economic employees of the organization. In addition, they keep records and store the results of the educational process and internal document flow on paper and/or in electronic digital form in accordance with legal requirements.

When training in educational programs using e-learning and distance learning technologies, the following models can be implemented: completely distance learning (advanced training, professional retraining) of the student (listener); partial use of distance educational technologies that make it possible to organize distance learning (advanced training, professional retraining) for the student (listener). Fully distance learning implies a training mode in which the student masters the educational program completely remotely using a specialized remote shell (platform), the functionality of which is provided by the organization. All communications with the teaching staff are carried out through the specified shell (platform) [2].

With partial use of distance educational technologies, the educational program is implemented by alternating face-to-face classes with distance learning. The application of these models by an educational institution depends in each specific case: on the developed regulatory framework (local acts of the organization regulating the procedure and features of the implementation of educational programs using e-learning, distance educational technologies); on the availability of the necessary material and technical base; on the appropriate level of the organization's personnel (whether administrative and teaching staff have appropriate basic or additional professional education); from organizing training and methodological support for teaching staff (improving the qualifications of such workers who provide training in educational programs implemented using e-learning, distance learning technologies).

In order to ensure smooth and timely mastery of the educational program by students, the following requirements for Internet access speed are recommended: using installed software and hardware for students and teaching staff - at a speed of at least 512 Kbps; in hard-to-reach areas connected to the Internet using satellite communication channels, the speed of the forward channel must be at least 512 Kbit/s, the reverse channel - at least 128 Kbit/s; an access port to the Network must be provided with a speed of at least 10 Mbit/s and the ability to establish at least 20 simultaneous sessions of 512 Kbit/s.

The Internet connection service must be provided 24 hours a day, seven days a week, without taking into account the volume of traffic consumed, with the excep-

tion of breaks for necessary repairs and maintenance work, while ensuring the total availability of services is at least 99.5% per month. To use distance educational technologies in the information and educational environment of a university, it is necessary to provide every student and teaching staff with free access to information and communication technologies [1].

Based on the above, to implement educational programs using e-learning and distance learning technologies, the organization chooses a model that is adequate to the resource and staffing of its information and educational environment. Having a programmer and a web designer on staff in addition to teaching staff who directly organize training using distance educational technologies, you can increase the level and quality of services provided to students, which is especially important when assessing the quality of the organization of inclusive education. Thus, approaches to assessing the quality of the inclusive educational process in educational organizations represent a wide range of quantitative and qualitative indicators that allow, on the one hand, to assess the social activity and academic performance of students with special needs, and on the other, to assess the group of conditions necessary for the most full involvement of all individuals in inclusive educational practices, one of which is the use of e-learning and distance learning technologies.

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俄罗斯大学对外俄语教学的特点和原则

FEATURES AND PRINCIPLES OF TEACHING RUSSIAN AS A FOREIGN LANGUAGE IN RUSSIAN UNIVERSITIES

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抽象的。 在本文中，作者重点介绍了俄罗斯大学对外俄语教学的特点和原则。 本文重点关注与俄语作为母语的学习直接相关的能力。 确定了通过实用言语方向进行俄语交际教学的细节。 作者在RCT课程中提出了“交际能力”这一范畴的概念，并定义了交际方法在教学过程中的含义以及外语教学中的交际原则。

关键词：词汇、外语、俄语教学、俄语作为外语、教育过程、高等教育。

Abstract. *In this article, the author highlights the features and principles of teaching Russian as a foreign language in Russian universities. The article focuses on competencies that are directly related to the study of the Russian language as a native language. The specifics of communication-oriented teaching of the Russian language through a practical speech orientation are determined. The author gives the concept of the category “communicative competence” and defines the meaning of a communicative approach in the education process on the RCT course, as well as the principles of communication in teaching a foreign language*

Keywords: *vocabulary, foreign language, teaching of Russian language, Russian as a foreign language, education process, higher education.*

Training in the Russian language as a foreign language has its own characteristics, which differentiate it from learning one’s native language, which is acquired unconsciously and naturally at an early age, as well as from learning other general and specialized disciplines. Acquiring a foreign language does not give a person direct knowledge of the real world. Mastering the resources of the language being

learned (vocabulary, grammar, phonetic system) is just one aspect of learning a foreign language. The main thing is the purpose for which these resources will be used in the student's future professional activities [1, p. 70].

Thus, the distinctive features of the subject "Russian as a foreign language" compared to the native language course are as follows: the language serves both as the goal and the means of learning; unlike the native language, the acquisition of which is unconscious and intuitive, the acquisition of a foreign language is carried out consciously; the practical goal of learning, aimed at mastering the language as a means of communication and acquiring the necessary skills for successful language proficiency, is considered dominant.

The objectives of learning, its content, levels of knowledge, skills, and abilities are determined through various types of competencies. Sub-competence is understood as the set of knowledge and skills that are formed in the process of learning the Russian language and contribute to mastering it.

We will consider the types of competence that do not have a direct relationship to the learning of the Russian language as native or cognate.

Language competence represents practical mastery of the material of the language system in a speech community where Russian is a non-native language or the improvement and development of language competence in a speech community where Russian is a native language.

Linguistic competence includes knowledge of the basics of the science of the Russian language, assimilation of the conceptual base of the course, and the formation of study language skills to work with language material.

Communicative competence is the knowledge, skills, and abilities necessary for understanding others and generating one's own speech programs, adequate to the goals, areas, and communication situations. It includes knowledge of the basic concepts of speech linguistics, skills in analyzing texts, and communicative skills related to various spheres and communication situations, taking into account the addressee and speech style [2; 3].

The formation of linguistic and communicative competencies are equally important tasks for teaching Russian as a non-native language and as a native one.

The peculiarity of communicative-oriented teaching of the Russian language lies in the practical speech orientation, which is not only the goal, but also the means.

According to the "Common European Framework of Reference for Languages" developed by the Council of Europe, language must be used for the purpose of communication. To do this, it is necessary to master certain knowledge and skills and master communicative competence.

The concept of "communicative competence" arose under the influence of N. Chomsky's concept of linguistic competence [4], which is understood as the

speaker's ability to generate grammatically correct utterances. Communicative competence includes in its structures:

- linguistic competence (possession of linguistic material for its use in the form of verbal utterances);
- sociolinguistic competence (use of language units in accordance with communication situations);
- discursive competence (the ability to understand and achieve coherence in the perception and generation of individual utterances within the framework of communicatively significant speech formations);
- the so-called “strategic” competence (familiarity with the sociocultural context of the functioning of the language);
- social competence (readiness to communicate with others).

“Proficiency in foreign language speech forms the basis of communicative competence, which is understood as the ability to solve vitally important extralinguistic problems by means of a foreign language. Communicative competence is based on speech competence - the ability to understand and produce oral and written statements at the level of sentences, super-phrase unity, text. Speech competence, in turn, is based on mastery of the required minimum of lexical and grammatical means, that is, on linguistic competence” [5, p. 23].

The communicative approach presupposes the creation of a teaching model that is “communicative” in terms of learning objectives (aimed at the formation of communicative competence) and active in the methods of educational actions and interactions that a person carries out.

The communicative approach determines the need to build the process of foreign language education as a model and process of communication. Essential features of a communicative approach to foreign language education, according to E.I. Passov, is anthropocentricity, cult-likeness, integrativeness, dynamism [6, p. 173].

The purpose of a foreign language as an educational discipline is to develop the student's individuality in order to prepare him for cultural dialogue (dialogical anthropocentrism). Each language reflects a different national culture; language helps to know the culture of an ethnic group and understand its features. In intercultural interaction, representatives of different cultures meet, having their own mentality. The goal of intercultural dialogue is to achieve mutual understanding - this means understanding the position of the interlocutor and respecting it.

The principles of communicativeness in teaching a foreign language were formulated by the Lipetsk methodological school at the 1st Congress of MAPRYAL in Moscow back in 1969.

According to Passov, in a foreign language culture (as the content of foreign language education) everything that a person learning a foreign language masters

in all four aspects of education is integrated. So, for example, “a student acquires knowledge about language as part of the culture of the race (cognitive aspect); develops his speech and general abilities (developmental aspect); masters ethical and moral standards (pedagogical aspect); forms speech skills (social aspect of foreign language education)” [7, p. 164].

Communicativeness has a whole complex of inherent characteristics, namely: the motivation of the student, that is, the performance of an action from an internal motivation, and not from external stimulation; the purposefulness of any action and any activity; personal meaning in all the student’s work; contact during discussion (emotional, semantic, personal); speech-thinking activity; expressiveness in the use of verbal and non-verbal means of communication; situationality and novelty as constant variability of all components of the educational process. Only compliance with all the listed parameters and their optimal use gives the right to call the educational process communicative.

So, the communicative method consists in likening the process of learning to the process of communication. It is based on the fact that the learning process is a model of the communication process, in its main parameters similar to the real communication process. The subject of study in this case is speech activity in a foreign language. With a communicative approach, the identification of speech skills and abilities is clearly visible, and exercises are proposed for their consistent formation.

In conclusion, we note that many modern methodologists are confident that the communicative approach to teaching RFL, with which active learning is associated, will remain leading in the methodology, since the main function of language is communicative and people learn languages in order to communicate in them. To develop communication skills, it is necessary to create conditions for verbal communication in the learning process. The work system should create the need for communication and the need for communication. Learning to communicate by communicating is the main character of the art of communication. This is expressed primarily in the special organization of educational material, the components of which are topics for speech development, a system of situational (communicative) exercises, and texts.

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A. S. 诗意中的英格兰形象 普希金

THE IMAGE OF ENGLAND IN THE POETIC BY A.S. PUSHKIN

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抽象的。文章阐述了A.S.作品中“英格兰”这一诗意意象的概念特征。考察了俄罗斯伟大诗人普希金世界艺术画卷中西方国家的整体形象，分析了俄罗斯文化意识的特点。

关键词：概念领域、概念、词位、英语地名、地理物体、诗意意识、概念特征。

Abstract. *the article describes the conceptual features of the poetic image “England” in the works by A.S. Pushkin, the overall image of the Western country in the artistic picture of the world of the great Russian poet is considered and the features of Russian cultural consciousness are analyzed.*

Keywords: *concept sphere, concept, lexemes, English toponyms, geographical objects, poetic consciousness, conceptual features.*

In the Russian consciousness the name A.S. Pushkin entered the national concept sphere of the people, was embodied in the concept of Russian culture, and became part of the Russian picture of the world. The principle of proportionality in literature approved by the poet, the idea of a “free” syllable, not burdened by cumbersome and difficult to understand turns of speech, as well as many other criteria of literary language, brought beautiful and perfect examples of Russian speech and thought into the world of art. His poetry represents those original, national foundations of folk philosophy that best reflect “our everything.” Interesting in this regard is the statement about Pushkin by one peasant at the end of the last century: “...Everything is somehow in him: Russian life, goodness and beauty” (Volkov 1989, p. 206).

The poet’s involvement in Russian destinies was not one-sided; it required entering an area of world space that was not homogeneous in terms of historical, cultural, geographical and ethnic development. As significant geocultural objects of Europe belonging to the territory of modern England, A.S. Pushkin mentions Albion and London. It is worth noting that the names mentioned in the era of the 19th century. did not have a positive assessment in the works of poets. As O.A.

Lavrenova writes, “in the 19th century, in addition to Rome, another topophobic object appears in Russian poetry - England. Albion is “gloomy”, Thames is “stingy” (Pushkin). But such a context for mentioning England, as well as the country itself, appears rarely in poetic works” (Lavrenova 1998, p. 43).

The purpose of this article is to describe the connotative features of the meanings of proper geographical names related to the territory of modern England, taking into account which the conceptual image of a Western country is formed in the minds of A.S. Pushkin.

In the course of analyzing examples with English toponyms, the following becomes clear: the poet, in naming geographical objects, follows the conventionally poetic tradition of the literary style: England - *Albion* (cf. France - Gaul, Italy - Ausonia). According to history, Albion is the ancient name of the British Isles, known to the Greeks. In the era of the XVIII-XIX centuries. this onym was actively used as a poetic name for England. In Pushkin’s poetry, the use of the lexemes *Albion* and *London* depends entirely on their semantics in the context. Thus, the connotative features of the *Albion* seme in the context are grouped around the semantic center of poems associated with poets (“singers”) and the special “poetry” of wars (“bloody battles and distant glory”). The general syntactic and stylistic role of this name in the text is to reduce the emotional image of the named country as a country that exports expensive, but completely useless things in the poet’s life, as a country where there were “bloody” past wars and distant (“distant”) glory, left in the past, like past battles.

... ..*Happy with my humble fate*
Diamonds, yachts, topazes,
Porphyry empty vases,
Why do they need Albion cloth?
And the lush covers of Lyon...?
(Message to Yudin, 1815)

And I think: why do singers
He doesn't see familiar tales
Sad Kyrialandia,
Not Albion, where I was looking
Bloody slaughter and distant glory...
(Vadim, 1822)

In another example, the semantic feature of the name is defined in a construction with the agreed definition “gloomy Albion”, equivalent to the appellative “foreign land”, and representing a toponymic periphrasis.

In M. Vasmer's dictionary, "darkness" is understood, on the one hand, as a borrowing from Church Orthodoxy. "trouble", i.e. "darkness, fog", and on the other, like "thick darkness, twilight" (Vasmer 1973, p. 657). In this example, the adjective gloomy is associated with the representation in the poet's mind of the mental characteristics of a given country, which connect this definition with an orientation towards the geographical position of England in comparison with other European countries (the mild maritime climate and temperature create foggy, cloudy weather).

*Stay forever as you are now,
Fly to gloomy Albion!
May they keep you in a foreign land,
Christ and faithful Cupid!*
(When you squeeze your hand again..., 1818)

Pushkin's examples include anthroponymic periphrases that mention toponymic objects in England. For example:

*Praise, O heroic youth!
With the wondrous hero of Albion
He led the faithful into the last battle
And took revenge for the lilies of Bourbon.*
(To the Prince of Orange, 1816)

*He is holy to the grandchildren of Apollo;
By the proud lyre of Albion
He is familiar to me, he is dear to me.*
(Eugene Onegin, 1825)

In these contexts, to adequately determine the meaning of the periphrase, let us turn to explanations of historical details in the context: "The Prince of Orange commanded the Dutch troops who fought against

Napoleon when he returned from Elba to Paris. Napoleon was defeated by the allied forces, led by the English Duke of Wellington (Pushkin 1974, vol. 1, p. 689). The name of England's national hero (Wellington) is hidden in the phrase "wonderful hero of Albion."

The expression "proud lyre of Albion" refers to the name and work of J. Byron, one of the prominent representatives of European romanticism. According to Yu.M. Lotman, in the 19th century. there were "two geniuses of romantic Europe - Byron and Napoleon."

In other examples, the image of England is associated with part of the whole space - London. In the poet's texts, London, unlike Albion, is embodied in a certain "living" image, presented in the dynamics of its life. The lexeme London is used in the context with the following meanings:

1. *London* - the British are engaged in selling goods abroad.

Everything for a plentiful whim

London trades scrupulously

And on the Baltic waves

He brings us lard and timber...

(Eugene Onegin, 1825)

In assessing the image of London as a personified space endowed with human essence, one should point out the meaning of the lexeme “scrupulous”, the seme of which contains connotative features of the name (London), and these lexical units themselves are consistent with each other in the poetic context. According to M. Vasmer’s dictionary, the word “scrupulous” was originally associated with the word “scrupulous - outfit, attire,” then the form “scrupulous” was formed, i.e. “to dress up, to be fashionable,” and after that the “scrupulous” appeared - “a haberdasher, a petty merchant” (Vasmer 1973, p. 503). As a result of the agreement “London is scrupulous,” London acquires the connotation of “dealing in haberdashery goods, all sorts of small things.” The hidden semes of the meaning of the lexeme London, defining not only people, but also the state, which is characterized indirectly by a number of the above characteristics, and therefore having a peripheral zone of expression, become: England - “bourgeois country”, “economic and political center of England”, “trading partner of Russia”, “trading capital of the world”.

Don't be afraid: I don't want to, seduced by a false thought,

To blaspheme censorship by the careless:

What London needs is too early for Moscow.

(Message to the Censor, 1822)

The connotative features of the seme *London* in the given context are the semes: “advanced”, “developed” in contrast to *Moscow* - “conservative”, “reactionary”, “in a state of stagnation”.

The expression “what London needs is too early for Moscow” in its syntactic construction resembles a Russian folk proverb.

1. London is the capital of Great Britain.

But London was calling for your attention. Your gaze

I diligently analyzed this dual council:

Here the onslaught is fiery, and there the rebuff is severe.

Springs bold new citizenship.

(To a nobleman, 1830)

As can be seen from this context, London here is the economic and political center of the state, which can also be concluded from a number of turns of phrase in the text: “a dual cathedral” is “an English parliament with two chambers - the Commons and the Lords” (Pushkin 1990, p. 234). The expression “new springs

of new citizenship” figuratively conveys the author’s idea about the significance of political cataclysms in England.

You can understand what the atmosphere was like in the life of the country by pointing to another name: the English poet William Blake was a contemporary of A.S. Pushkin, he happened to live in an era (1757-1827) that dramatically changed the stereotypes of Western consciousness. The article says the following about this: “He was a contemporary of two great revolutions: the American of 1776 and -thirteen years later - the French. The Napoleonic wars raged. Ireland was worried. Driven to despair, workers broke machines, and Lord Byron made a speech in parliament defending the Luddites” (Blake 1982, p. 5). Thus, an image of England is emerging as a “progressive” country, fighting for new foundations in the life of the state, acting against everything reactionary in its development.

Thus, the conceptual image of England is updated by the following connotative features:

Albion is the name of England in ancient times (a poetic name used by A.S. Pushkin in relation to poets (poetry) and military events).

Albion is an exporting country, a trading partner of Russia, and the trading capital of the world.

Albion is a “foreign” country in which reigns bourgeois spirit.

Albion is the birthplace of J. Byron.

Albion is a country during the Napoleonic Wars.

London - the British are engaged in trade with Russia.

London is the capital of Great Britain, the center of the country’s political and economic life, a “progressive” country opposing the reactionary mentality of its era.

The lexeme England is included in the concept sphere of A.S. Pushkin according to a number of connotations characterizing the “mental world” of the poet, in which the image of a Western country is formed through indirect pictures of the world, and the author’s consciousness perceives this image as “visible” to the poet from Russia.

The ability to widely see other countries as one’s own country brings A.S. Pushkin closer together with English poets J. Byron, W. Blake. Thus, the paraphrased words spoken about W. Blake are also applicable to the “gift” of A.S. Pushkin: “This gift, clearly expressed by Pushkin, is amazing how directly involved in Russian destinies and one’s own destiny are events, phenomena, collisions of distant countries and distant eras, to realize the integrity, indivisibility of humanity, the interconnection of countless phenomena of the physical and spiritual world, their transitivity, their moving unity” (Blake 1982, p. 25).

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异常行为：概念、类型、诊断和使用测谎仪的可能性
**DEVIANT BEHAVIOR: CONCEPT, TYPES, DIAGNOSIS AND
POSSIBILITIES OF USING A POLYGRAPH**

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抽象的。越轨行为的基本理论问题长期以来得到了很好的研究。同时，拟议的文章讨论了“问题”，即没有明确解决方案的复杂的、有争议的问题。本文讨论的问题包括“偏差”概念的范围、类型问题、积极偏差问题以及传统心理诊断中运用一系列心理因素来诊断偏差行为的问题。测试，并在测谎仪钥匙中使用测谎仪。对上述问题的探讨是本研究的理论意义所在。该研究的实际意义在于，提出了根据主题形成的具体调查问卷，以识别访谈和使用测谎仪期间的特定类型的异常行为。

关键词：越轨行为、成瘾行为、犯罪行为、自杀风险、对服役的消极态度、特种军事行动、测谎仪。

Abstract. *The basic theoretical issues of deviant behavior have been well studied for a long time. At the same time, the proposed article discusses “problems”, i.e. complex, controversial issues that do not have a clear solution. Such problems discussed in this article include the problem of the scope of the concept of “deviation”, its types, the problem of positive deviation, as well as the problem of diagnosing deviant behavior both in the course of traditional psychodiagnostics using a battery of psychological tests, and using a polygraph in a lie detector key. The discussion of the above problems is the theoretical significance of the study. The practical significance of the study is that specific questionnaires are proposed, formed on a thematic basis, to identify a specific type of deviant behavior both during an interview and using a polygraph.*

Keywords: *deviant behavior, addictive behavior, delinquent behavior, suicidal risk, negativism towards service, special military operation, polygraph.*

As State Secretary - Deputy Minister of Internal Affairs of the Russian Federation Igor Nikolaevich Zubov consistently notes in his speeches to the scientific community, scientific research must be updated by the specific conditions

of the situation. In the context of a special military operation, it is in the military organization of society (in the army and navy) that the most advanced methods of psychodiagnostics are developed, which, when analyzing problems of deviant behavior, forces us to pay attention to the approaches that exist on the problems of diagnosing deviant behavior specifically in the Armed Forces. It is known from open sources that in psychodiagnostic practice in the Armed Forces of the Russian Federation it is generally accepted that deviant behavior is an integral indicator on the following four scales: suicidal risk; addictive (dependent) behavior; delinquent (offending) behavior; negativism towards military service. This approach seems correct to us, since there must be well-defined boundaries of the concept of “deviation” (it, this concept, should not be “like an accordion”, i.e. have blurry, indefinite boundaries), since the establishment of deviant behavior in psychodiagnostics entails military personnel, employee, employee have legal relevant (significant) and, as a rule, negative consequences that can limit and in practice do limit the social mobility of a person during his movement, promotion, significantly affecting rights, freedoms and legitimate interests. Therefore, when a psychologist reports to the commander (superior) about the deviant behavior of a particular serviceman (employee), the commander (superior) must understand that we are talking about only one of the four listed risks (suicidality, addiction, delinquency, negativism) or about a combination of these risks.

It is important to understand that there is a concept of “positive deviation”, i.e. deviant behavior that has socially positive consequences. The existence of this concept (“positive deviation”) in psychology is largely due to the fact that for a psychologist (unlike, for example, a teacher, educator) there is no “good” and “bad” person, but only a “suitable” and “not suitable” person for performing this or that type of activity, for working in certain environmental conditions, in a specific social environment. Here we recall the words of Moreno (practicing psychologists are well aware of his methodology – sociometry according to Moreno) that “revolutions should be made not social, but sociometric”, i.e. putting the right people in the right place. It is well known that the same person, being in one social environment, can be very productive in activity and be completely unproductive if he finds himself in a different social environment, in a group with whose members he is psychologically incompatible. So, for example, we consider suicidal behavior to be a type of deviant behavior; a suicidal incident in peacetime in a military unit is one of the most serious incidents for which officials of a military unit responsible for the life and health of military personnel can be held legally accountable, even criminally. And vice versa, in a combat situation, a soldier is required to have the ability to self-sacrifice, the ability to overcome the basic instinct – the instinct of self-preservation. We say that “the valor of a soldier consists in getting up from a trench and going under the enemy’s bullets, not sparing his very life.”

It is no coincidence that one of the most famous photographs in the world of the Second World War was the photograph of political commissar Alexei Gordeevich Eremin, who on July 12, 1942, near the village of Khoroshoe, Lugansk region of the Ukrainian SSR, replaced the deceased commander, himself rose from the trench and by personal example raised soldiers to attack, as a result which was killed a few seconds after the famous photograph was taken, which became a symbol of self-sacrifice for many generations of military personnel. There is no doubt that in combat conditions a serviceman with a high degree of propensity for suicidal reactions to stress is more likely to give his life for his homeland, and in this situation his behavior, which we consider “deviant with a marker of suicidal risk,” will be a socially “positive deviation.” «Thus, to “real combat work” a person with a high degree of propensity to suicidal reactions is more suitable for solving problems in combat conditions associated with a risk to life. This, in many ways, has always been the key to the success of our “army, indestructible and legendary, which in battles knew the joy of victory,” as the famous song about the Soviet army correctly says.

Another example is related to a negative attitude towards military service (“deviant behavior with the marker negativism towards military service”). There is no doubt that a person who is burdened by serving in a military unit is ill suited for military service in these conditions. And, conversely, the same serviceman can be effective in activities in conditions where he is required to serve in a “civilian” social environment, for example, in operational work, in special conditions.

The prognostic value of psychological science lies in the fact that, having correctly established the individual psychological characteristics of the subject, we can give his probabilistic behavioral forecast, i.e. already “here and now” it is scientifically reasonable to assume how a given specific person will behave “there and then”, in specific situations of leading activities - in play, learning, work, communication.

How to diagnose (identify) deviant behavior? We offer a series of questions grouped into four thematic blocks: suicidal risk, addictive (dependent), delinquent (offending) behavior and negativism towards military service. These questions can be presented to the subject both in writing (in a psychological testing situation) and orally (during an interview).

The following questions can be used *to identify suicidal risk*: “Do people you try to be friends with often hurt you?”; “Do you think that in some situations life can lose meaning for a person?”; “Do you often feel that others don’t understand you well, don’t appreciate you, or even don’t like you?”; “Do you find it difficult to adapt to new living conditions?”; “Do you think that people who choose voluntary death can be justified?”; “Is it true that the meaning of life is not always clear, sometimes it can be lost?”; “You don’t condemn people who try to die?”;

“Can a person’s choice of voluntary death in ordinary life be justified?”; “Is it true that you have been depressed lately and that the future seems hopeless to you?”; “Do you understand people who don’t want to move on with their lives if they are betrayed by their family and friends?”; “Have there been any cases of voluntary death or (attempted death) in your family?”

To identify *addictive (dependent) behavior*, the following questions can be used (referring to alcohol, drug and gaming addiction): “Can you drink a large amount of alcohol while hanging out with friends?”; “Have your friends told you that in some situations they experienced unusual states, saw colorful and interesting visions, heard strange and unusual sounds?”; “Has it ever happened that your hands were shaking in the morning, and your head was just pounding?”; “Is it true that you cannot force yourself to quit smoking, although you know that it is harmful?”; “Do you often experience a feeling of weightlessness in your body, detachment from the world around you, and the unreality of what is happening?”; “In civilian life, did you drink alcohol once a week or more?”; “Have you ever heard voices inside your head, the sound of your own thoughts?”; “Do you have friends who like to “watch cartoons” after taking various substances?”; “Is it true that recently, in order not to break down, you have been forced to take valerian, phenazepam and other sedatives?”; “Have you tried to free yourself from bad habits? If “yes”, then from which ones?”; “When drinking alcohol, did you often exceed your limit?”; “Have your relatives expressed concerns about your habits?”; “Have you been experiencing such stress lately that you have to take sedatives?”; “Did you have any problems while studying (at work) due to drinking alcohol?”; “Do you find it unpleasant to remember and talk about some incidents that were associated with the use of alcohol or drugs?”; “Can your friends relax and enjoy themselves?”; “Do you think that your father abused alcohol?”; “Do you like to gamble because it gives you the opportunity to shake things up and catch your chance?”; “Don’t you judge people who smoke weed?”; “Do you agree that there is nothing wrong with people trying to experience unusual states by smoking something or taking any substances?”; “Is it true that you will no longer be able to cope with some of your habits, even if you really want to?”; “Lately, have you noticed that you have started smoking a lot, as this allows you to escape from your worries and worries?”

To identify *delinquent (offending) behavior*, the following questions can be used: “Are you cruel to others?”; “Are there any of your friends who led an unhealthy lifestyle?”; “At school, did you strive for friendship with peers who were older than you?”; “Is it true that in a state of aggression you are capable of much?”; “Are there any criminals among your relatives?”; “Do you agree that the younger generation is influenced by so many different circumstances that the efforts of parents and teachers to educate them are useless?”; “Is it true that if someone is to blame for your troubles, then you will find a way to repay him for it?”; “Your

parents don't like the people you're friends with?"; "Do you think the principle of "an eye for an eye, a tooth for a tooth" is correct?"; "If someone did you harm, did you consider yourself obligated to repay him in kind?"; "In the locality where you lived, were there youth groups that were actively fighting with each other?"; "At your school (college) was there a ritual of "registration" of newcomers, in which you actively took part?"; "Can you agree that you are not very inclined to comply with many laws, considering them unreasonable?"; "Among your friends are there those who often left home and wandered?"; "Do you think that any provision of laws and military regulations can be interpreted in two ways?"; "Did your friends often avoid studying because they found it boring?"

To identify *negativism* towards military (law enforcement) service, the following questions can be used: "Do you consider yourself unsuited for military (law enforcement) service?"; "Do you agree that men should serve in the army and navy only at their own request?"; "Do you think that the greatest difficulties for you during your service will be associated with the need to obey the requirements of commanders (superiors)?"; "Don't you like being commanded so much that it makes you feel protest?"; "Don't you condemn young men who evade military service?"; "Is it more important for you to serve "calmly" and in a "quiet place" than to carry out serious and dangerous command assignments?"; "Are you feeling more and more disillusioned with military (law enforcement) service?"; "Do you want to devote your entire life to military (law enforcement) service?"; "During your service, will you try to avoid performing complex and responsible command assignments?"; "Has the oath of allegiance to the Fatherland lost its relevance in modern conditions?"

These same questions can be used (with certain adjustments) as relevant (test) questions when testing on a polygraph.

One of the methods that is effectively used in the professional psychological system both for the prevention of offenses and for their detection and investigation is the psychophysiological method of identifying hidden information using a polygraph.

A polygraph (literally translated from Greek "poly" means "many", "graph" means "I write") is a medical-biological device designed for simultaneous recording of several physiological indicators, where registration is a systematic record, and a physiological indicator is this is how the work of one of the organs or systems of a living organism is manifested externally. The main physiological indicators recorded during a polygraph test include respiration, heart rate, blood pressure, blood filling of the blood vessels of a person's fingers (photoplethysmogram), galvanic skin response, tremor.

The specified device – a polygraph – can be used as a "lie detector", i.e. to determine physiological reactions to presented stimuli, where a stimulus is an ex-

ternal, targeted irritating effect on the human body, presented in the form of signs; signs are understood as a material, sensually perceived object (event or action), acting as an indicator, designation or representation of another object, event or action (signs come in the form of words, pictures, video sequences, diagrams). The main type of stimulus in polygraphology (psychophysiological lie detection) is a question, but it can also be a drawing, diagram, etc. To a question that serves as a stimulus, a reaction follows (from the Latin “reactio”, i.e. “answer”, “reverse action”), which is recorded by a polygraph. When examining a polygraph, certain types of questions are used - indicative, neutral, testing and control. In what follows, the following conventions will be used: O – orientational question; N – neutral question; R – relevant (test) question; C – control question. Below we will look at questions that can be asked on a polygraph to identify deviant behavior.

After the pre-test interview on the polygraph, a stimulus test (usually a name or a number) is used as the first test. Let us give an example of a number stimulus test. The instruction is presented: “Think of a number from one to five. Imagine this number. Try to draw this number with your eyes.” Then the number stimulus test questions are presented: “Is your number 7?/0”; “Is your number 6?/N”; “Is your number 5?/R”; “Is your number 4?/R”; “Is your number 3?/R”; “Is your number 2?/R”; “Is your number 1?/R”; “Is your number in your phone number?/C.”

To identify deviant behavior, the following questions of a screening (“screening”) test can be presented: “Do you understand the topic of the study?/0”; “Do you currently live in Moscow?/N>”; “Do you have any reason to hide anything from me during the the polygraph test?/C”; “Have you had problems at work because of alcohol?/R”; “Ever tried illegal substances?/R”; “Have you ever bet an amount equivalent to half your salary in games?/R”; “Do you have any delays in paying debts or loans?/R”; “Do you have any friends associated with crime?/R”; “Do you have a criminal record?/R”; “Have you ever falsified documents for profit?/R”; “Have you ever appropriated someone else’s property without the owner’s knowledge, worth more than 3 thousand py6.?/R”; “Do you have illegal income?/R”; “Have you agreed with third parties on the transfer of confidential information?/R”; “Did you try to fool the polygraph in this test?/R”; “Are you capable of deceiving for profit?/C.”

If significant reactions to a particular test topic are observed in response to the questions of a screening polygraph test (“screening”), then we present this topic to the subject separately with detailed questions about it. Next, we present an approximate battery of tests for diagnosing deviant behavior using a polygraph (the proposed tests are compiled according to the Utah formula - ONCRNCRNCR).

To identify *addictive (dependent)* behavior, a battery of tests on the topics: “Alcohol”, “Drugs”, “Gambling”, “Debts” can be presented on a polygraph.

Variant of the test battery for polygraph testing on the topic “Alcohol”: “Are you comfortable sitting?/O”; “Is it Wednesday today?/N”; “Do you want to get

this job?/C”; “Have you ever drank alcohol during work hours?/R”; “Is your name Nikolai?/N”; “Are there people with alcohol addiction among your relatives?/C”; “Have you ever missed work because you drank too much alcohol?/R”; “Is it December now?/N”; “Do you like the taste of alcohol?/C”; “Have you ever gone on a drinking binge?/R”; “Were you born on May 28?/N”; “Have you ever drank alcohol in secret from your superiors?/R”; “Could you kill a person under the influence of alcohol?”

Option of a test battery for polygraph testing on the topic “*Drugs*”: “Do you understand the topic of the study?/O”; “Is it winter now?/N”; “Are there any drug addicts among your friends?/C”; “Have you taken illegal substances without a doctor’s prescription?/R”; “Do you understand all the questions?/N”; “Do you have a positive attitude towards drug addicts?/C”; “Have you tried drugs more than three times?/R”; “Are you comfortable sitting?/N”; “Have you met a drug addict in a state of withdrawal?/C”; “Have you ever taken drugs?/R”; “Are you sure that your reactions don’t give you away?/C.”

Option of a test battery for polygraph testing on the topic “*Gambling*”: “Do you understand the topic of the study?/O”; “Do you know the names of any book-makers?/N”; “Do you know cases when a person lost an apartment?/C”; “Have you placed bets in the last 2 years?/R”; “Have you seen casino advertisements on the Internet?/N”; “Are there any players among your friends?/C”; “Does the total amount of investment in gambling exceed your monthly salary?/R”; “Have you ever seen slot machines?/N”; “Are you capable of losing your life at cards?/C”; “Have you ever borrowed money to place a bet?/R”; “Is card debt sacred?/C.”

Variant of the test battery for polygraph testing on the topic “*Debts*”: “Have you ever borrowed money from someone?/O”; “Do you know the name of the organization “Bystrodingi”?/N”; “Are you ready to kill for a debt?/C”; “Are you in arrears in repaying debts (loans)?/R”; “Do you have many debtors?/N>”; “Are you familiar with the activities of collectors?/C”; “Have you ever gone into hiding because of debt?/R”; “Do you understand all the questions?/N”; “Are you able to forgive a debt of more than 100 thousand rubles?/C.”; “Do you have debts that you cannot repay yet?/R”; “Did you answer all the questions on this test honestly?/C.”

To identify delinquent (offending) behavior, batteries of tests on the topics: “*Crime*”, “*Criminal Records*”, “*Forgery*”, “*Theft*”, “*Illegal income*”, “*Espionage*” can be presented on a polygraph.

Option of a test battery for polygraph testing on the topic “*Crime*”: “Do you know representatives of the criminal world?/O”; “Have you seen the movie “Brigade”?/N”; “Are you familiar with “thieves’ concepts”?/C”; “Did you provide assistance to representatives of the underworld for profit?/R”; “Do you know representatives of the criminal world?/N”; “Have you suffered from the activities of criminals?/C”; “Were representatives of criminals asking you for help?/R”; “Have

you ever been to a police station?/N”; “Do you like thieves’ romance?/S”; “Did you assist criminals?/R”; “Are you afraid of going to jail?/C.”

Option of a test battery for polygraph testing on the topic “*Criminal Records*”: “Have you read the Constitution?/O”; “Are you familiar with the Criminal Code?/N”; “Have your friends been detained by the police?/C”; “Have you ever been detained by the police?/R”; “Do you know your rights?/N”; “Are you capable of breaking the law?/C”; “Was a criminal case opened against you?/R”; “Did you witness the crime?/N”; “Have you ever been accused of breaking the law?/C”; “Have you ever been under investigation?/R”; “Are you familiar with unscrupulous police officers?/C”

A variant of the test battery for polygraph testing on the topic “*Forgery*”: “Have you ever drawn up documents?/O”; “Do you know the rules for drawing up documents?/N”; “Do you have a positive attitude towards forgery of documents?/C”; “Have you ever had to falsify documents?/R”; “Do you understand all the questions?/N”; “Did you feel guilty when you signed for your boss?/S”; “Are all your documents true?/R”; “Are you familiar with the term “office work”?/N”; “Among your acquaintances are there people who have ever forged documents?/C”; “Did you falsify documents for employment?/R”; “Are you afraid that you might be charged with forgery of documents?/C.”

A test battery option for polygraph testing on the topic “*Theft*”: “Do you know people who committed thefts?/O”; “Are you familiar with the term “theft”?/N”; “Do you have a positive attitude towards theft?/C”; “Have you ever appropriated someone else’s property without the owner’s knowledge?/R”; “Do you understand all the questions?/N”; “Have you ever been robbed?/C”; “Have you ever appropriated someone else’s property for more than 3 thousand rubles?/R”; “Have you ever seen how a theft is committed?/N”; “Are there thieves among your friends?/S”; “Have you ever assisted in a theft?/R”; “Are you capable of stealing?/C”.

Test battery option for polygraph testing on the topic “*Illegal income*”: “Have you ever had multiple sources of income?/O”; “Are you able to work two jobs?/N”; “Do you have a positive attitude towards corruption?/C”; “Have you ever received additional income secretly from your superiors?/R”; “Do you understand the topic of the test?/N”; “Have you ever been accused of corruption?/C”; “Did you take advantage of your official position to obtain benefits?/R”; “Do you understand all the test questions?/N”; “Are you capable of taking a bribe?/C”; “Have you previously had illegal income?/R”; “Are there any scammers among your friends?/C”.

Test battery option for polygraph testing on the topic “*Espionage*”: “Do you know what military intelligence is?/O”; “Have you ever seen a spy?/N”; “Are you able to divulge secrets?/C”; “Have you received any requests to transfer confidential information?/R”; “Do you understand all the test questions?/N”; “Are you considered an unreliable person?/C”; “Have you agreed with third parties

on the transfer of confidential information?/R”; “Are you feeling well?/N”; “Are there traitors among your friends?/C”; “Have you had unauthorized contacts with intelligence services?/R”; “Have you ever felt like you were being watched?/C.”

At the end of the polygraph test, a test battery is usually presented on the topic “*Counteraction*”: “Have you encountered a polygraph before?/O”; “Do you understand the topic of the test?/N”; “Do you think that your reactions can give you away?/C”; “Did you try to resist the polygraph during this test?/R”; “Do you understand all the test questions?/N”; “Did you prepare for today’s testing?/C”; “Have you studied ways to counter the polygraph?/R”; “Have you taken a polygraph test before?/N”; “Are you capable of lying for profit?/C”; “Did you take any drugs to counteract this polygraph test?/R”; “Do you like lying?/C”.

You need to understand that the questions used in the psychodiagnostic test (given in the first part of this article) are mainly aimed at identifying social attitudes. The essence of the attitude theory is that what is the attitude (from the English word “attitude” which means “angle” or “viewpoint”), i.e. “attitude” of the subject to this or that phenomenon, then his behavior is likely to be the same, i.e. external mental activity. For example, if a subject has a positive attitude towards the use of alcohol and drugs, then he is likely to use them himself. However, this theory also has a number of disadvantages. The theory of attitude is not able to explain all behavior (Lapierre’s paradox, Rokeach’s explanatory hypothesis) and provide, although a scientifically based, but still probabilistic forecast.

Questions presented as stimuli on a polygraph are aimed at identifying “ideal traces in a person’s memory” (Yu.I. Kholodny), at identifying facts that took place in a person’s past. We believe that during polygraph testing, an “archival method of personality research” is implemented, the essence of which is that if in the past the subject committed certain actions under certain conditions, then in the future, if similar conditions arise, it is possible to expect the same behavior from the person. The disadvantage of the archival method of personality research is that not in all cases in the future the subject will behave in the same way as he behaved in the past.

Thus, in our study, we drew attention to the need to limit the scope of the concept of deviant behavior, examined the problem of “positive” deviation, and established that in the psychodiagnostic practice of a military psychologist, diagnosing deviant (deviant) behavior means establishing one or more of its components - suicidal risk, addictive (dependent), delinquent (offending) behavior and negativism towards military service. They proposed questions for diagnosing deviant behavior both when conducting traditional testing and interviews, and when conducting research using the psychophysiological method of lie detection using a polygraph in a lie detector key. We have established the limitations of the psychodiagnostic capabilities of both traditional batteries of psychological tests (since they identify

a social setting (attitude), which is not always necessarily manifested in external mental activity, i.e. behavior), and questionnaires used in polygraph testing, which reveals behavior in the past, while behavior in the past does not always mean that a person will behave in a similar way in the future. The practical significance of the study is that the author proposed specific questionnaires for diagnosing (identifying) deviant behavior of military personnel, which can be used in law enforcement practice.

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大西洋鲑鱼 *Salmo salar* L. 胚胎在胚胎发生不同阶段的抗生素活性
**ANTIBIOTIC ACTIVITY OF ATLANTIC SALMON *SALMO SALAR*
L. EMBRYO AT DIFFERENT STAGES EMBRYOGENESIS**

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抽象的。大西洋鲑鱼胚胎的防御特性取决于卵黄、卵周间隙和胚胎组织液的抗生素活性以及受损时发生的形态发生过程。对金黄色葡萄球菌、黄八球菌、白痢沙门氏菌、溶壁微球菌进行的实验揭示了其特征：在胚胎发生的早期阶段，在胚胎循环系统出现之前，胚胎液的抗生素活性表现得非常清楚。

关键词：大西洋鲑鱼 (*Salmo salar*)、抗生素活性、胚胎、胚胎发生、卵周间隙液、金黄色葡萄球菌、黄八叠球菌、白痢沙门氏菌、分枝杆菌、溶壁微球菌。

Abstract. *The defensive properties of Atlantic salmon embryos depend on the antibiotic activity of the yolk, perivitelline space and embryonal tissue fluids as well as morphogenetic processes, occurring when damaged. The experiments carried out with Staphylococcus aureus, Sarcina lutea, Salmonella pullorum Mycobacterium album, Micrococcus lysodeikticus revealed characteristic feature: at the early stages of embryogenesis Salmo salar before the appearance of the embryo circulatory system, the antibiotic activity of embryonic fluids is expressed very clearly.*

Keywords: *Atlantic salmon (Salmo salar), antibiotic activity, embryo, embryogenesis, perivitelline space fluid, Staphylococcus aureus, Sarcina lutea, Salmonella pullorum Mycobacterium album, Micrococcus lysodeikticus.*

Preface

The defensive properties of Atlantic salmon embryos depend on the antibiotic activity of the yolk, perivitelline space and embryonal tissue fluids, as well as morphogenetic processes, occurring when damaged. The antibiotic activity of embryonic fluids is expressed very clearly at the early stages of embryogenesis *Salmo salar* before the appearance of the embryo circulatory system. Experimental work was carried out at fish farms of the Murmansk region in Kandalaksha, Umba, Taybola.

In first series of experiments, carried out on *Salmo salar* eggs, revealed that the perivitelline space fluid does not have antimicrobial activity against *Staphylococcus aureus*, *Sarcina lutea*, *Salmonella pullorum* in a one-day cultures. The fluid of the yolk exhibits bacteriostatic and bactericidal activity against *Mycobacterium album*, *Micrococcus lysodeikticus*.

In second series of experiments, eggs were placed on plain agar (MPA) with the surface ten-day seeding culture of *Sarcina lutea*, *Micrococcus lysodeikticus*, *Mycobacterium album*, *Salmonella pullorum*. There were small zones of inhibition of microorganisms width of about 2 mm. The growth of extraneous microflora on MPA was observed.

In third series when dissecting the eggs there were zones of growth inhibition and sometimes - no growth zone of *Sarcina lutea*, *Micrococcus lysodeikticus*, *Mycobacterium album*. The non-permanent bacteriostatic effect of eggs on the growth of *Salmonella pullorum* was detected. In the boundary area there was always zones of growth stimulation of test - microorganisms width of about 2-3 mm.

In fourth series of experiments, eggs were kept in Petri dishes during the twenty-four hours at 6-8 °C. Then the eggs were carefully removed, and the Petri dishes were placed in a thermostat (30°C). In these experiments, the bacteriostatic properties of salmon eggs developed weakly and not constantly.

In fifth series distinct zones of growth inhibition of a width exceeding 5 mm. were observed during experiments on the cold storage of crushed eggs in the paper squares during 12 hours. Further, as in the previous experiment, Petri dishes were placed in the thermostat. *Micrococcus lysodeikticus*, *Salmonella pullorum*, *Sarcina lutea* were used as a test microorganisms. After a day poor growth of microorganisms was registered in the area of a paper square and a pronounced inhibition of growth on the MPA around paper square was observed. Probably, the secondary stimulation of the initially suppressed growth of microorganisms was closely related to the fact that traces of yolk, slightly diffusing in the MPA, could serve as a good nutrient medium for tested microorganisms.

In sixth series experiments, the number of extraneous microorganisms located on the salmon eggs was studied. 30 Petri dishes with MPA were prepared. Then 5 eggs were rolled from one edge of the cup to another. Then the eggs were removed, and the Petri dishes were placed in the cold for 12 h, and then transferred to the thermostat. A number of small white colonies (about 0.5 mm) had grown in five Petri dishes, in seven Petri dishes - a few small white colonies along the rolled track of a single egg.

In seventh series experiments eggs were cut slightly near the eye area, fluid of perivitelline space was leaking on the MPA. Petri dishes were placed in the incubator. In most cases (70%) no growth zones and zones of inhibition of growth of *Mycobacterium album*, *Sarcina lutea* were detected. The growth of extrane-

ous microflora wasn't observed. It is noted that the perivitelline space fluid had a weak bacteriostatic effect on *Micrococcus lysodeikticus*. The perivitelline fluid in the experiments did not show bacteriostatic and bactericidal activity against *Salmonella pullorum*.

In eighth series experiments, the yolk was poured on a paper disk, and then after various intervals from 30 minutes till 12 hours the paper was cleared away. The liquid portion of the yolk diffused into the MPA. One day after keeping of Petri dishes in an incubator, there were wide zones of inhibition of growth, and in some cases, no growth areas that went beyond the paper disk on 5 mm. The germination of test microorganisms was found in the place of MPA contact with the paper disk. This fact can be explained by the fact that the yolk having high viscosity is a good nutrient medium for microorganisms. At the same time, the zone of no growth was detected on the periphery of the paper disc, both at the surface inoculation and the deep inoculation of the test microorganisms.

The experiments revealed characteristic feature: at the early stages of embryogenesis *Salmo salar* before the appearance of the embryo circulatory system, the antibiotic activity of embryonic fluids is expressed very clearly.

人工智能 (AI) 在黑色素瘤诊断领域的现代能力
**MODERN CAPABILITIES OF ARTIFICIAL INTELLIGENCE (AI)
IN THE FIELD OF MELANOMA DIAGNOSES**

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注解。黑色素瘤是最具侵袭性和危险性的皮肤癌，由转化的黑色素细胞发展而来。在早期原位检测黑色素瘤非常重要，因为在这个阶段它是“可治愈的”。然而，到了晚期，发生转移后，黑色素瘤治疗起来比较困难，五年生存率仅为25%[1]。恶性黑色素瘤有4种类型，根据组织学特征进行分类，按如下列出：其出现频率[2]：

A 型：浅表扩散黑色素瘤 SSMM 是最常见的恶性黑色素瘤类型，发生于任何年龄。地层直径大于0.5厘米。它可能有颜料图案和不均匀性(缺口边缘)。

B 型：结节性恶性黑色素瘤 NMM - 通常呈圆顶状，颜色为深棕色或黑色。溃疡和出血的结节不太常见，但恶性程度更高。这种类型的黑色素瘤通常具有清晰的边界和对称性。

C 型雀斑样黑色素瘤 LMM 是一种特殊类型的恶性黑色素瘤，发生于老年人长期暴露在阳光下的身体部位，尤其是面部。该地层以粉红色、灰色、蓝色和白色的各种杂质为代表，边界往往非常不均匀和锯齿状。总尺寸范围为 1.0 至 20.0 厘米或更大。它开始时是一个棕色斑点，沿着周边扩散，逐渐混合变暗，最后变成明显的丘疹、结节或斑块。

D 型。肢端雀斑样黑色素瘤是一种特殊形式的黑色素瘤，主要发生在手掌、脚底或甲下区域。地层边界可能有明显的凹凸不平和凹口；尺寸从 0.9 到 12 厘米或更大不等。病变后期可见隆起丘疹或结节1，颜色黑色，常溃烂[2]。

尽管黑色素瘤仅占有所有皮肤癌的 4%，但它却占皮肤癌死亡的 80%，而且只有 14% 的转移性黑色素瘤患者能存活五年。

如今，在诊断皮肤黑色素瘤时，也使用侵入性方法，例如切除和切开活检。它们允许您采集组织样本以进行更准确的诊断。皮肤黑色素瘤的早期诊断是改善此类肿瘤患者生活预后的有效方法。现代诊断方法旨在更准确地确定皮肤黑色素瘤的诊断，尤其是在疾病的早期阶段，对于选择最佳的治疗策略发挥着重要作用，是实现疾病最佳预后的关键因素。值得注意的是，目前诊断皮肤黑色素瘤的方法仍需要进一步改进。结合和整合不同的方法和技术有可能显著提高诊断准确性并有助于黑色素瘤的早期检测。这反过来又会带来更有效的治疗并增加患者的生存机会。皮肤黑色素瘤是最具侵袭性和最危险的癌症类型之一。近几十年来，此类癌症的发病率显著增加[3]。因此，早期诊断是一个紧迫的公共卫生问题。皮肤黑色素瘤可以在检测的早期阶段进行治疗，因为在此期间，它可以存在数年，并且生长缓慢。在这方面，早期诊断黑色素瘤和寻找新的现代早期诊断方法仍然是该领域的优先工作领域[4]。如今，现代方法是使用基于人工智能（AI）的皮肤镜图像进行早期诊断。近年来，皮肤镜研究的重点是特定区域和特定黑色素瘤亚型的黑色素瘤的皮肤镜标准，最重要的是机器学习，它允许在无需人工干预的情况下根据皮肤镜图像训练计算机诊断算法[5]。

关键词：皮肤黑色素瘤，早期诊断，皮肤镜检查，人工智能。

Annotation. *Melanoma is the most aggressive and dangerous form of skin cancer, which develops from transformed melanocytes. It is very important to detect melanoma in its early stages, in situ, as at this stage it is “curable”. However, in later stages, after metastasis, melanoma is difficult to treat, and the five-year survival rate is only 25% [1]. There are 4 types of malignant melanoma, which are classified according to histological features and are listed below according to their frequency of occurrence [2]:*

Type A: Superficial spreading melanoma SSMM is the most common type of malignant melanoma, occurring at any age. The diameter of the formation is more than 0.5 cm. It may have a pigment pattern and unevenness (notched borders).

Type B: Nodular malignant melanoma NMM - usually dome-shaped and dark brown or black in color. A nodule that ulcerates and bleeds is less common but is more malignant. This type of melanoma often has a clearly defined border and symmetry.

Type C Lentigo melanoma LMM is a special type of malignant melanoma that develops in chronically sun-exposed parts of the body, especially the face, in older adults. The formation is represented by various impurities of pink, gray, blue and white, the boundaries are often very uneven and jagged. The total size can range from 1.0 to 20.0 cm or more. It begins as a brown spot, spreading along the periphery with gradual mixed darkening and becomes palpable as a papule, nodule or plaque.

Type D. Acral lentiginous melanoma is a special form of melanoma that primarily develops on the palms, soles, or subungual areas. The boundaries of the

formation may have noticeable unevenness and notches; the size varies from 0.9 to 12 cm or more. In the later stages of the lesion, raised papules or nodules are observed [1], black in color, often ulcerated [2].

Although melanoma accounts for only 4% of all dermatologic cancers, it accounts for 80% of skin cancer deaths and only 14% of patients with metastatic melanoma survive five years.

Today, when diagnosing skin melanoma, invasive methods are also used, such as excisional and incisional biopsies. They allow you to take tissue samples for a more accurate diagnosis. Early diagnosis of skin melanoma is an effective way to improve the life prognosis of patients with this type of tumor. Modern diagnostic methods that are aimed at more accurate determination of the diagnosis of skin melanoma, especially in the early stages of the disease, play an important role in choosing the optimal treatment tactics and are a key factor in achieving the best prognosis for the disease. It is important to note that current methods for diagnosing cutaneous melanoma still require further improvement. Combining and integrating different approaches and techniques has the potential to significantly improve diagnostic accuracy and aid in the early detection of melanoma. This, in turn, leads to more effective treatment and an increased chance of survival for patients. Skin melanoma is one of the most aggressive and dangerous types of cancer. In recent decades, the incidence of this type of cancer has increased significantly [3]. Therefore, early diagnosis is a pressing public health issue. Skin melanoma can be treated in the early stages of detection, since during this period it can exist for several years and be characterized by slow growth. In this regard, diagnosing melanoma in the early stages and the search for new modern methods of early diagnosis remain priority areas of work in this area [4]. Today, the modern method is early diagnosis using dermoscopic images based on artificial intelligence (AI). In recent years, dermatoscopy research has focused on dermoscopic criteria for melanoma in specific areas and specific subtypes of melanoma, and most importantly on machine learning, which allows computer diagnostic algorithms to be trained from dermoscopic images without human intervention [5].

Keywords: skin melanoma, early diagnosis, dermatoscopy, artificial intelligence.

Purpose of the study - identify the effectiveness of artificial intelligence (AI) in image-based diagnosis of melanoma and nevi.

Materials and methods. 16 qualified dermatologists took part in the work, which presented dermoscopic images of melanomas and nevi. 4 sets were presented (each set included 50 images with a size of 768*560). A total of 200 images were examined, each set containing 90 images of nevi, 80 images of atypical nevi,

30 images of melanomas. Doctors were divided into two groups. Each group included 8 doctors. In the first group, doctors had to classify images first only on the basis of personal experience (Experiment 1), then analyze them with the support of a convolutional neural network (Experiment 2). The second group of doctors had to classify images first based only on personal experience for 5 hours (Experiment 3). Then analyze the same images with the support of a convolutional neural network (experiment 4). As a result, doctors needed to diagnose melanoma or nevus based on the image.

The artificial intelligence (AI)-based dermoscopic imaging method uses 4 main stages of a predictive skin cancer detection model: preprocessing, segmentation, feature extraction, and classification. Pre-treatment includes image enhancement and hair removal. A Gaussian filter is used to reduce noise in dermoscopic images, and the segmentation process is based on a k-means algorithm. It is noted that the effectiveness of the method can be increased by using deep learning methods, which use an ultra-precise neural network and long short-term memory.

Results. Studies have found that neural networks were more accurate in diagnosing melanoma. Doctors correctly diagnosed 72.2% of the images, and 80.4% with artificial intelligence (AI)-based dermoscopic images. If doctors made a final diagnosis with the support of a convolutional neural network, the diagnostic efficiency increased significantly, by approximately 8.2%. As a result of the analysis, it was revealed that doctors who were limited in time made more mistakes than the first group of doctors. The more images doctors analyzed, the more errors were identified. Without the support of artificial intelligence (AI) convolutional neural network, the efficiency of the doctors' result (time-limited) was reduced by 10% compared to the first group. In this work, a modern method for early diagnosis of melanoma was proposed using digital image processing methods, the algorithm of which includes 4 stages: preprocessing, separation, diagnostic extraction features.

Conclusions. The analysis showed the effectiveness of the modern artificial intelligence (AI) method in diagnosing melanoma and nevi based on images. Comprehensive diagnostics allows for timely detection of melanoma at an early stage, which increases the likelihood of successful treatment of melanoma in patients. To summarize, modern methods of diagnosing cutaneous melanoma play a critical role in early detection and increase the possibility of successful treatment of this aggressive form of cancer. The development of new technologies and careful research allow us to effectively identify potentially dangerous skin lesions [6].

One of the key advances is improved imaging techniques, including physician observation and the use of dermatoscopy, which allows changes in skin pigmentation and structure to be more accurately determined in the shortest possible time for the patient. The time and accuracy of diagnosis is a critical factor in patient treatment.

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十二烷基硫酸盐对溶菌酶的抑制
INHIBITION OF LYSOZYME BY LAURYL SULFATE

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溶菌酶是一种具有溶菌活性的酶。溶菌酶还参与调节免疫反应，作为一种调理素和促进抗原被免疫细胞吞噬并被呈递的必要因子。因此，破坏溶菌酶溶菌活性的物质也可能会影响免疫系统的功能。

十二烷基硫酸钠（又名十二烷基硫酸盐，SDS）是一种表面活性剂，通常作为化妆品的基本成分，特别是洗发水和牙膏。我们发现抑制溶菌酶活性的十二烷基硫酸钠的浓度比化妆品中允许的浓度低两到三个数量级（牙膏中为 35 mM，洗发水中为 870 mM）。

研究结果确定了溶菌酶活性降低 50% 时的十二烷基硫酸钠浓度（IC₅₀）。在 pH 值为 7.0（人类口腔的特征 pH 值）时，IC₅₀ 值为 0.26 ± 0.03 mM，在 pH 值为 8.5（人类头皮的 pH 值）时，IC₅₀ 值为 0.29 ± 0.04 mM。文献中有证据表明，十二烷基硫酸钠可引起皮肤病。我们的研究表明，至少这种表面活性剂造成的负面影响之一是对溶菌酶的抑制。获得的数据表明需要修订化妆品中十二烷基硫酸钠的含量标准。

溶菌酶、酶抑制、十二烷基硫酸钠、SDS、表面活性剂

Abstract. *Lysozyme is an enzyme with bacteriolytic activity. Lysozyme is also involved in the regulation of the immune response, as an opsonin and a necessary factor in the functioning of antigen-presenting phagocytic immune cells. Thus, substances which harm the bacteriolytic activity of lysozyme are also potentially able to affect the functionality of the immune system.*

Sodium lauryl sulfate (also called dodecyl sulfate, SDS) is a surfactant, often applied as a basic component of cosmetic remedies, particularly shampoos and toothpastes. In the following research we have discovered inhibition of lysozyme activity by sodium lauryl sulfate in concentrations two to three orders of magnitude lower than the permissible concentrations of this substance in cosmetics (35 mM in toothpastes, 870 mM in shampoos).

As a result of the research, the concentrations of sodium lauryl sulfate were determined at which the activity of lysozyme decreases by 50% (IC_{50}). При pH 7.0 (the pH value characteristic for human oral cavity) the value of IC_{50} equals 0.26 ± 0.03 mM, at pH 8.5 (human scalp pH value) it equals 0.29 ± 0.04 mM. There is evidence in the literature about skin diseases caused by the action of sodium lauryl sulfate. Our research demonstrates that at least one of the factors of the negative impact caused by this surfactant is inhibition of lysozyme. The data obtained show the necessity of revising the standards for the content of sodium lauryl sulfate in cosmetics.

Keywords: *lysozyme, bacteriolytic enzyme, enzyme inhibition, sodium lauryl sulfate, SDS, surfactants.*

Introduction

Lysozyme is a bacteriolytic enzyme that destroys bacterial cells by means of hydrolysis of their cell walls. It is present in various forms in all known groups of vertebrates, including humans [1, 2]. The functions of lysozyme in the human organism are not limited only to its antibacterial enzymatic activity; lysozyme is also involved in the regulation of the immune response [2—4]. In particular, it acts as an opsonin (a protein that promotes antigen recognition by immune phagocytic cells) [3, 4] and as a basic instrument for the destruction of the pathogenic bacteria cell in the lysosomes of an antigen-presenting phagocytic immune cell [4]. Lysozyme also demonstrates antiviral and anticancer activity [2, 5—9].

Considering the variety of physiological roles of lysozyme, it should be noted that a negative impact on its structure and activity can lead to serious consequences for the human organism. That is why the search for lysozyme inhibitors among substances that somehow contact with the body is especially relevant.

Sodium lauryl sulfate, or sodium dodecyl sulfate (SDS) is an amphiphilic compound with surface activity. Toothpastes contain SDS in concentrations up to 1% by mass (equal to 35 mM), and shampoos contain up to 25% (870 mM) [10]. Con-

sequently, lysozyme contained on the skin and oral mucosa undergoes influence of SDS. However, despite its ubiquitous application, sodium dodecyl sulfate is not safe for the skin even in concentrations allowed by contemporary standards: there is evidence in the literature about skin diseases caused by its action. SDS in concentrations exceeding 0.1% can cause irritation and inflammatory process when it contacts with human skin [11—14].

Interaction of lysozyme with surfactants, including SDS, has been discovered before, concerning the hydrolysis of *Lactobacillus plantarum* cells: in this case SDS inhibits lysozyme [15]. We should note that the effect of the inhibitor on lysozyme can vary significantly depending on the specific type of cell hydrolyzed by lysozyme [16, 17], and consideration of various types of bacteria in this capacity is an urgent subject of investigation.

The lysozyme substrate chosen in this work was *Micrococcus luteus* cells, which have properties of the cell wall similar to the ones of pathogenic *Streptococci* and *Staphylococci*, but this substrate is non-pathogenic itself, which allows us to work with them as a safe model substrate.

The conditions chosen for the study for measuring lysozyme activity in the presence of SDS were pH 7.0 (characteristic for the oral cavity) and pH 8.5 (close to the pH value of the scalp). The purpose of this work is to determine the concentration of SDS that reduces the activity of lysozyme by half.

Materials and methods

Materials applied in this work include: chicken egg lysozyme, lyophilized *Micrococcus luteus* cells, Tris, MES (Amresco, USA); HCl (“Komponent-reaktiv”, Russia); NaOH, sodium dodecyl sulfate (Panreac, Spain). For solution preparation we used distilled water.

Preparation of the lysozyme substrate, a suspension of *Micrococcus luteus* cells, was performed immediately before the experiment. 3 mg of cell powder were suspended in 1 mL of the buffer solution (the same one in which lysozyme activity was subsequently measured) and centrifuged at the MiniSpin centrifuge (Eppendorf, Germany) during 4 minutes at 3500 rpm (3160g). Then the sediment was re-suspended in 1.5 mL of the same buffer solution.

Lysozyme activity measurements were carried out in 0.01M Tris-MES buffer solutions with pH values of 7.0 and 8.5. The measurements were carried out on a Uniplan microplate scanning spectrophotometer (Pikon, Russia) by the rate of decrease in the absorption of a bacterial cell suspension [18] at the wavelength of 450 nm at the temperature of 25°C, in 96-well microplate with the well volume of 250 µL. The initial absorbance of cell suspension in microplate wells was 0.3—0.35. Lysozyme concentration in each well was 0.4 µg/mL. Registration of kinetic curves was performed during 20 min. Errors were calculated using the Student distribution for a confidence interval of 0.9. Each measurement was carried out in at least 6 repetitions.

Results

We have obtained the dependence of lysozyme activity on the SDS concentration and found the SDS concentrations at which 50% of lysozyme activity is inhibited (IC_{50}) (Fig. 1). IC_{50} at pH 7.0 is 0.26 ± 0.03 mM, at pH 8.5 it is 0.29 ± 0.04 mM.

The permitted SDS content of toothpaste is 1% by mass or 35 mM, which is a hundred times higher than the obtained IC_{50} . The SDS content in shampoos is 25% by mass or 870 mM, which is more than two thousand times higher than the obtained IC_{50} . Thus, even toothpastes and shampoos diluted a hundred times present a potential threat to health, and existing SDS content standards for both shampoos and toothpastes actually require revision. Concerning the multiple functions of lysozyme in the immune system, we can assume that the harmful effects of SDS known from the literature [13—15] are at least partly caused by a decrease in the functionality of lysozyme.

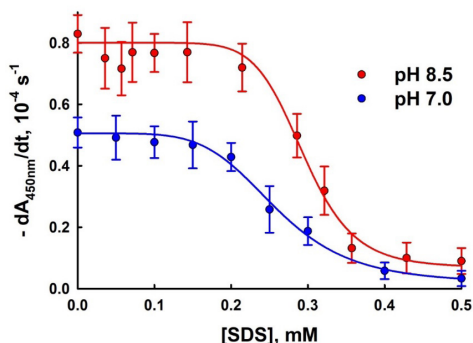


Figure 1. Dependence of lysozyme activity on SDS concentration, $T = 25^{\circ}\text{C}$. The concentration of lysozyme in the reaction medium is $0.4 \mu\text{g/ml}$.

Conclusions

Our data confirm the fact that even the permissible content of SDS in cosmetics is not harmless to the human body due to the disruption of the functionality of lysozyme.

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食品工业用酶制剂中活性溶菌酶以及蛋白质和肽杂质的测定

**DETERMINATION OF ACTIVE LYSOZYME AND IMPURITIES OF
OTHER PROTEINS AND PEPTIDES IN ENZYME PREPARATIONS
FOR THE FOOD INDUSTRY**

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溶菌酶是一种具有溶菌活性的酶，在食品工业中被用作天然蛋白质防腐剂。例如，鸡蛋溶菌酶制剂被用于奶酪生产，以抑制奶酪制作过程中的细菌污染。由于在分离、纯化和储存后，酶可能具有不同程度的质量：目标物质的纯度、活性酶的比例和杂质的类型，因此需要控制酶的组成和活性。我们研究了几种分析方法对酶制剂分析的适用性，分析方法的选择标准是基于分析速度、无需稀有和昂贵的试剂以及能够在传统分析实验室中使用简单的基本设备进行分析等因素。为了测定蛋白质和肽，我们采用缩二脲法和Bradford法，研究药物的吸收光谱，并使用比浊法测定活性溶菌酶的浓度。

通过分析用于奶酪生产的药物成分，我们发现药物成分的组成如下：活性溶菌酶占45%，失活溶菌酶占7%，非蛋白质和非肽杂质占17%（可能是无机盐，例如氯化钠）。该制剂还含有31%的蛋白质，该蛋白质不是溶菌酶，也不含色氨酸残基——很

可能是胶原蛋白或由胶原蛋白制成的明胶。由于用于生产溶菌酶的原料（鸡蛋）中不含胶原蛋白，这意味着该杂质很可能是有意添加的。

因此，所选的一组方法已被证明对于快速分析用于奶酪制作的溶菌酶制剂具有适用性。

溶菌酶、活性溶菌酶、蛋白质测定、奶酪制作、食品工业

Abstract. *Lysozyme is an enzyme with bacteriolytic activity. In the food industry it is used as a natural protein preservative. For example, a preparation of chicken egg lysozyme is used in cheese making to prevent bacterial contamination during cheese ripening. Lysozyme preparations require control of composition and enzymatic activity, since as a result of isolation, purification and storage, the enzyme can have different grades of quality, namely the purity of the target substance, the proportion of active enzyme, and the type of impurities. The following research demonstrates the applicability of several analytical methods for the analysis of an enzyme preparation. Methods for analysis were chosen concerning such considerations as rapidity, absence of need for rare and expensive reagents, and also, they could be performed using basic equipment of a conventional analytical laboratory. Protein and peptides were determined by the microbiuret method and the Bradford method, the absorption spectra of the preparation were investigated, and the proportion of active lysozyme was determined by turbidimetry.*

As a result of the analysis of the composition of the preparation for cheese making, the following ratio of components was revealed: active lysozyme is 45%, inactivated lysozyme 7%, non-protein and non-peptide impurities are 17% (probably inorganic salts, such as NaCl), and the preparation also contains 31% protein that is not lysozyme and does not contain tryptophan residues - probably collagen or gelatin made from collagen. Collagen (which does not contain tryptophan) is absent in the raw material for the production of lysozyme - in a chicken egg, then, with a high probability, the impurity was added deliberately.

Thus, the applicability of the selected complex of methods for the rapid analysis of lysozyme preparations for cheese making has been demonstrated.

Keywords: *lysozyme, active lysozyme determination, protein determination, cheese making, food industry.*

Introduction

Enzymes were used in food preparation long before the concept of “enzyme” appeared in chemical science. The modern food industry uses enzyme preparations produced by means of the most modern technologies for protein isolation and purification. The functions of these preparations are extremely diverse [1—3]; in particular, enzymes that have the ability to destroy bacteria are used as preservatives, completely safe from the point of view of digestion by the organism, in particular lysozyme, isolated from the chicken egg white [3, 4]. Lysozyme per-

forms bacteriolytic activity, i.e., catalyzes the hydrolysis of bacteria cell walls. Lysozyme content in chicken egg white is 3,5% by mass [5], and due to its relatively low cost, it has found wide application in the food industry, in particular, in the production of hard cheese [3]. The problem of enzyme preparation analysis, concerning composition and activity, is very relevant for incoming quality control of raw materials in the food industry, since commercial preparations of large-scale production in any case (due to imperfect purification technologies) may contain both impurities of external proteins and products of partial hydrolysis of proteins, i.e. peptides. Purification of a preparation for the food industry increases the cost of this preparation significantly. [6]. Inactive (inactivated) enzyme in the composition of the product can also accumulate as a result of violation of purification and storage conditions. In addition, there may be a problem of deliberate addition of foreign substances to enzyme preparations in case to reduce their cost. Considering all these factors, determination of the amount of total protein and active enzyme is an extremely important stage in quality control of enzyme preparation.

In this research, we present an example of the analysis of a commercial preparation applied as a preservative in cheese making, for determination of active lysozyme, as well as characterization of the composition and amount of impurities contained in the preparation. At the same time, we evaluate the effectiveness of various methods for protein detection and analysis: the Bradford method is applied here for determination of globular proteins [7], and the microbiuret method is used for determination of peptides (proteins and low-molecular peptides) [8—10], while determination of active lysozyme by its enzymatic activity is conducted by means of the turbidimetric method [11—12].

Materials and methods

Materials

Materials applied in this work include: standard chicken egg white lysozyme, Tris, lyophilized *Micrococcus luteus* cells (Amresco, USA); HCl, orthophosphoric acid (70%), CuSO_4 , Na_2CO_3 , citric acid (“Komponent-Reaktiv”, Russia); ethanol (Ferrein, Russia); NaOH (Panreac, Spain), Coomassie G-250, bovine serum albumin (Sigma-Aldrich, USA). For preparation of solutions we used distilled water. All the spectral measurements were conducted at the UV-1800 spectrophotometer (Shimadzu, Japan). The pH values of solutions were controlled, when necessary, by means of Orion 420 pH-meter (Thermo Scientific, USA).

In this research, a standard preparation of lysozyme for cheese making, available in retail and wholesale distribution networks, was used for analysis (to avoid a conflict of interest, we do not indicate the name of the company that manufactures the preparation).

Investigation of absorption spectra.

Registration of the spectra of standard chicken egg lysozyme aqueous solution (1 mg/mL concentration) and aqueous solution of the preparation (1 mg/mL

concentration) absorbance was conducted in a quartz cuvette with the volume of 1 mL.

Determination of globular protein concentration by the Bradford method.

The reagent was prepared using a procedure similar to the standard one [7]. To prepare the reagent, 25 mg Coomassie G-250 pigment is mixed with 12.5 mL ethanol. The mixture is stirred with a glass rod for 5–10 minutes, to make the amount of undissolved Coomassie as little as possible. 25 mL concentrated phosphoric acid is added to the mixture in small portions (several mL), stirring each time in a glass. The mixture obtained is diluted with water up to 250 mL, and water is also added by small portions (25-50 mL each), while the reagent is stirred rapidly.

To conduct the experiment, 500 μ L water is added to the reference cuvette, by which we set the zero absorbance level, and protein solution ((500-X) μ L water and X μ L standard protein solution as calculated) is added to other cuvettes, protein solutions are stirred. (Cuvettes are made of polystyrene, the volume is 1 mL.) 500 μ L of the Bradford reagent is added and stirred together. The cuvettes are incubated for 5-10 minutes at room temperature, and then the absorbance of the solution is measured at the wavelength of 595 nm. To obtain the calibration dependence of the analytical signal on protein concentration standard preparation of bovine serum albumin was applied in the range of 2–20 μ g of protein in the sample. The calibration curve is nonlinear (Fig. 1A). The calculated detection limit of the method is 0.5 μ g of globular protein per sample or 1 μ g per mL.

Determination of peptide concentration by the microbiuret method [8-10]

The Benedict reagent for the microbiuret method was prepared by means of a new method, based on a previously modified method [10]. 12.6 g citric acid is dissolved in 30 mL water. 8.06 g sodium hydroxide is dissolved in 30 mL water. Solutions are mixed together by adding the first solution into the second one by small portions. While they are mixed the solution is heated due to neutralization reaction. In the resulting hot solution, 10 g sodium carbonate is dissolved. Then 1.73 g copper sulfate dissolved in 10 mL water is added. The mixture is then diluted with water up to 100 mL.

Separately, a solution of 6% NaOH in water is prepared (we dissolve 6 g of NaOH in water and bring the volume to 100 mL).

To conduct the experiment, into each spectrophotometric cuvette (polystyrene, 1 mL volume) 500 μ L water (the reference cuvette, by which we set the zero absorbance level) or 500 μ L protein solution ((500-X) μ L water and X μ L standard protein solution as calculated) is added, then 500 μ L 6% NaOH is added and stirred together. 50 μ L of the Benedict reagent is added to each cuvette and stirred again. The cuvettes are incubated for 15-20 minutes at room temperature, and then the absorbance of the solution is measured at the wavelength of 330 nm. To obtain the calibration dependence of the analytical signal on protein concentra-

tion standard preparation of bovine serum albumin was applied. The calibration dependence is linear (Fig. 1B). The calculated detection limit of the method is 25 μg peptide per sample or 50 μg per mL.

Determination of active lysozyme concentration [11-12].

For enzymatic activity measurement, the preparation of lyophilized *Micrococcus luteus* bacteria cells was applied. Immediately before the experiment, 3 mg of cell preparation were suspended in 1 mL of 0.02M Tris buffer solution, pH 8.5. Enzymatic activity (decrease rate of cell suspension absorbance, $-\text{d}A/\text{d}t$) measurement was conducted in 0.02M Tris buffer solution, pH 8.5, at the temperature of 37°C in quartz cuvette with 1 mL volume, at the wavelength of 650 nm. The initial concentration of the chicken lysozyme standard solution prepared for calibration was 0.1 mg/mL. The initial absorption of the cell suspension in the cuvette was 0.43—0.45. The value of cell sedimentation rate (in absence of the enzyme solution and preparation sample solution) was less than 1% of enzymatic cell lysis rate. As a calibration graph, we plotted the dependence of activity on the amount of lysozyme (lysozyme concentration in the sample, in the cuvette). The calibration dependence is linear (Fig. 1C). The calculated detection limit of active lysozyme is 0.05 μg per sample (in 1 mL) or $3.5 \cdot 10^{-9}$ M.

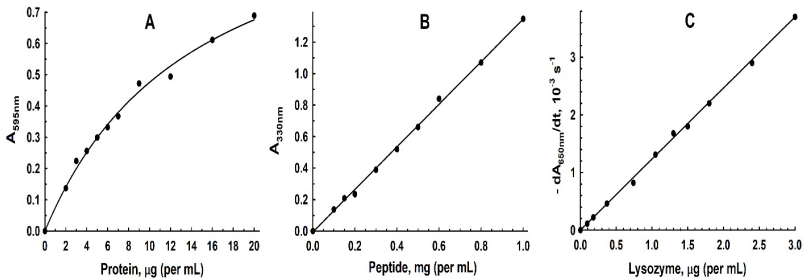


Figure 1. A: Calibration dependence of the light absorbance at 595 nm on the mass of protein in a sample for the Bradford method of protein determination. **B:** Calibration dependence of the light absorbance at 330 nm on the mass of peptide in a sample for the microbiuret method of peptide determination. **C:** Calibration dependence of the cell hydrolysis reaction rate on the concentration of active lysozyme in a sample for the turbidimetric method of lysozyme determination.

Results

For analysis, a sample of the lysozyme preparation for cheese making was dissolved in water in concentration of 1 mg per mL. Colorless transparent solution is obtained. When comparing the spectra of a standard lysozyme solution and

a sample of the preparation (Fig. 2), it is clear that the shape of these spectra is similar (there is a typical tryptophan spectrum of the protein without non-tryptophan impurities that absorb light in the ultraviolet spectrum region). Concerning the absorbance value at the wavelength of 280 nm (maximum of absorbance for tryptophan), we can see that protein content (if we submit that all the protein of this preparation is lysozyme) equals 0.52 mg/mL at the mass concentration of the preparation itself of 1 mg/mL.

The content of active lysozyme is 0.45 ± 0.05 mg per mL, or 45%, what is close to the results of the direct spectrophotometric method.

Determination of protein by the Bradford method and determination of peptide by the microbiuret method yielded results of $86 \pm 5\%$ and $80 \pm 4\%$, respectively (average value is $83 \pm 9\%$), i.e. the results of protein (peptide) determination by the two methods are almost identical.

Since the protein spectrum in the UV region mainly consists of the absorption of the tryptophan residue, significantly higher protein content detected by the Bradford and microbiuret methods compared to the direct spectrophotometric method demonstrates presence of some protein, which does not contain tryptophan residues, in the preparation. We suppose this is collagen or gelatin, i.e. we can deal with deliberate addition of external protein, not declared by the manufacturer, into the preparation in case to reduce the cost of this product.

Thus, a complex analysis of the composition of the preparation allowed us to identify the following composition (Table 1): 52% is lysozyme (45% is active lysozyme and 7% is inactivated lysozyme); 31% is protein impurity not containing tryptophan residues, which is not lysozyme; and the remaining 17% of the sample is a mixture of unknown non-protein and non-peptide impurities (probably inorganic salts such as NaCl).

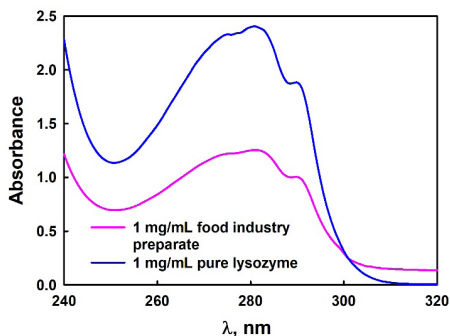


Figure 2. Spectra of standard chicken egg lysozyme aqueous solution and aqueous solution of the preparation being analyzed, concentration of both is 1 mg/mL.

Table 1.

Results of the analysis of the preparation for cheese making, obtained by various methods.

Method	A_{280}	Active Lysozyme	Bradford method (protein)	Biuret method (peptide)
Result	52%	45±5%	86±5%	80±4%

Conclusions

The complex of 4 methods for analyzing the protein composition of an enzyme preparation – analysis of spectra in the UV region, the microbiuret method, the Bradford method and measurement of lysozyme catalytic activities – allows us to determine the content of active lysozyme in the preparation and evaluate the composition of impurities. Using the example of a lysozyme preparation for cheese making, we managed to identify the content of external protein in this preparation, which means that the approach suggested in this research is applicable for simple and rapid quality control for preparations produced for the food industry.

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俄语和英语中“临终关怀”概念的一些语义特征
**SOME SEMANTIC FEATURES OF CONCEPT “HOSPICE” IN THE
RUSSIAN AND ENGLISH LANGUAGES**

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注解。 本文致力于识别影响“临终关怀”概念语义特征变化的语言外因素。与俄罗斯相比，美国、英国临终关怀发展水平的显著差异对俄语和英语术语提名系统中普遍存在的通用特定等级特征产生了影响。 积极参与社会学领域中“临终关怀”一词的语义领域的命名，是因为所分析的概念具有新的社会文化意义，使其超越了医学现实。 因此，现在可以将“临终关怀”概念视为一种道德范畴、人格特质、生活方式。

关键词：临终关怀、语言外因素、语义、通用特定层次结构、衍生词、语义原。

Annotation. *The article is devoted to the identification of extralinguistic factors influencing the changes of semantic characteristics of the concept “hospice”. Significant variation of hospice care development level in the USA, Great Britain in comparison with Russia, has an impact on the generic specific hierarchy features prevailing in the system of terminological nomination in the Russian and English languages. Active involvement in the nomination of semantic field with a generic seme “hospice” words from the field of sociology is due to the new socio-cultural significance of the analyzed concept taking it beyond medical reality. As a result of this it is possible now to consider the concept “hospice” as a moral category, personality trait, lifestyle.*

Keywords: *Hospice, extralinguistic factors, semantics, generic specific hierarchy, derivatives, seme.*

In the Russian language, the word “hospice” began to be actively used in the 20th century. The examples below from various lexicographic publications show how the definitions of the concept “hospice” have changed chronologically:

1. "A special clinic for hopeless patients, where all conditions are created to alleviate human sufferings";
2. "Specialized boarding hospital for incurable patients";
3. "Hospital for seriously ill patients in the last stage of the disease...";
4. "A specialized institution for the care of terminally ill patients...";
5. "An inpatient health care institution for the provision of medical, social and legal assistance to mainly incurable cancer patients in order to provide pain therapy, care, psychosocial rehabilitation, as well as psychological and social support for relatives."

The above definitions show that the word "hospice" has functioned and continues to function in its original meaning with the dominance of the seme "place". However, due to the active development of the hospice movement, the semantic scope of the word "hospice" has expanded. It has become to be used as a designation for part of the palliative care system, which includes the concept of care for dying patients and comprehensive support to the patient and his loved ones during the period of care and after loss.

The expansion of the derivational abilities of the lexical unit "hospice" currently indicates its new semantic saturation: "hospice movement"; "hospice service"; "hospice care"; "hospice programs"; "hospice industry"; "hospice services", "hospice schools", "hospice homes" The presented phrases demonstrate the presence of a social component in their semantics, which allows us to consider the activities of providing hospice services as a more significant social phenomenon, and to recognize hospices as a social institution of post-industrial society. At the same time, in the activities of hospices, "the regulatory ethical principle of respect for human life is naturally transformed into the idea of the "human right to a dignified death." The implementation in hospices of the human right to "death with dignity" in its sociocultural significance goes beyond the scope of medical reality and reflects the characteristic features of civilization as a whole." Receiving full, qualified care in a hospice while creating an open environment of communication with family and friends helps to maintain a person's sense of social significance.

Modern hospices, being medical institutions with their own specific, put forward work aimed at solving the social and family problems of their patients as one of their priorities. This is the fundamental difference in the provision of care in a regular hospital and a hospice. This extralinguistic factor determines the active involvement in the semantic field with the generic seme "hospice" not only medical terms, but a significant amount of vocabulary from the field of sociology. A striking example of such a conclusion is the expression of "ideology of the hospice movement", in which the value of the defining component "ideology" predetermines a socially significant entity. The level of development of hospice care varies significantly across the world. The World Atlas of Palliative Care presents a scale

according to which 80 countries around the world were divided by the World Health Organization into four groups depending on the level reflecting the quality of palliative and hospice care. The top ten includes, for example, such countries as the UK and the USA, where palliative care has been introduced into the healthcare system. The list of key quality indicators includes the level of education and competence of doctors in palliative care, the availability of pain relief, the number of hospices per capita and the degree of state support in this area. At the same time, there is a need for strategic integration of palliative care with programs aimed to the prevention, timely detection and treatment of cancer in children and adults. In the present scale, Russia is only on 48th place, occupying a place in the third group of countries in which separate palliative care centers operate. Raising hospice care to the proper level and transforming it into one of the most important parts of the modern healthcare system is connected with significant organizational, economic and political obstacles.

In the UK, there is a wide variety of types of hospice care, which also leads to the identification of a fairly extensive genus-species series, which is based on the qualifying attribute “type of care: generic term (GT): “hospice care”.

In the USA, “respite care” is included in one of the four main types of care provided by hospice: “hospice care”, “routine home care” (“usual home care”); “continuous care”, “inpatient hospice care” or “general inpatient care” (“inpatient hospice care” or “general inpatient care”); “respite care” (“delayed care”).

The need for institutional long-term care potentially represents the fastest growing segment of the Medicare hospice market. (Medicare is the national health insurance program in the United States for people 65 years of age and older, and is also provided to some people under 65 years of age.) Their category includes, for example, disabled people and patients suffering from permanent renal failure or amyotrophic lateral sclerosis (Charcot’s disease). In the USA, hospice care is available in various institutions and the qualification is “place of care”, then the following genus-specific hierarchical series is built: “hospice care”; “residential (care) homes” - “nursing homes” - “homes for veterans”, “hospitals”, “prisons”. These examples indicate an expansion of the semantic scope of the concept “hospice” and it is going beyond the basic meaning of “building or institution.” The dominant meanings are the semes “system”, “approach” to provide specialized services to a wide range of citizens.

This linguistic phenomenon is directly determined by such an extralinguistic factor as the state’s approach to this type of activity, which is reflected in the definition of the very concept of “hospice”. “In the United States, the term “hospice” refers to government-controlled organizations or programs that provide care to dying patients and their families...” Another determining factor in the active development of hospice services in America and some other countries is economic

benefit, i.e. opening hospices can be viewed as a competitive business. “Hospices bring economic benefits to any state. And quite a lot. Americans evaluate the economic feasibility of hospices by the value of the gross national product produced by relatives freed from caring for the hopelessly ill.” The recognition in the United States of the need to find innovative, cost-effective, and community-oriented approaches to improve hospice care has led to the emergence of new terms such as “TeleHospice.”

Cultural and religious traditions play a significant role in the active development of the hospice industry. In Western countries, “living out” old age in various hospice-type institutions is considered the norm, which also influences the wide variety of vocabulary in the field of activity under study.

One of the fundamental factors influencing the quality of service provision in end of life is an appropriate environment that can help meet the physical, social, spiritual and psychological needs of both patients and caregivers. In order to create access to maximum comfort in the analyzed service area, the National Palliative and End of Life Care Partnership published a six-year plan in 2021. In the United States, a criterion (the only one to date) has been developed that attempts to assess the attitude of health care workers towards end-of-life care. Based on the principles of hospice philosophy, this criterion is called the Hospice Philosophy Scale (HPS). In many other countries and in Russia in particular, the concept of “end of life care” is likely to be included in the general term “palliative care”.

Relatively recently, the analyzed layer of vocabulary was replenished with the term “respis” (from the English “respite care”). The word “respis” functions in Russian with the meaning “social respite”. In the UK, this type of hospice care is quite developed. Its essence lies in the fact that in this case the hospice operates, first of all, as a place for recreation, in which patients are given the opportunity to leave a child who requires continuous care for the weekend or during their vacation. In Russia, there is currently the only place located on the territory of the Marfo-Mariinsky Convent. Undoubtedly, the word “respis” is known to a very narrow circle of users; moreover, the foreign word “hospice” itself, so often found in the Russian language, has not yet had time to establish itself, become established, and due to the polysemy of the concept itself, it is interpreted differently. Hospice is a home, a refuge, and a philosophy that helps practitioners and volunteers understand one of the most difficult issues related to life and death. Moreover, one of the main provisions of hospice activities is formulated as follows: “a hospice is not a building, but people called upon to bring compassion, love and care to those who are on the verge of death”) [1].

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高中生的发病率，取决于强度不同的学校教育形式

**MORBIDITY RATES IN HIGH SCHOOL STUDENTS, DEPENDING
ON THE FORMS OF SCHOOLING THAT VARY IN INTENSITY**

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注解。对 211 名高中适龄儿童进行了检查，以确定慢性病理学。考虑到学校教育的强度影响学生的健康，所有儿童被分为 2 组。在传统教育课程的学校中，有 102 名学生接受了检查，而在深入学习科目的中学中，有 109 名学生接受了检查。所有儿童的视觉器官、肌肉骨骼系统和内分泌系统的慢性病理水平均有所增加。然而，慢性病理结构的比较分析显示，中学生组的视觉器官和肌肉骨骼系统疾病水平明显较高。两组儿童中，除主要疾病外，平均有 2.2 ± 0.6 种伴随疾病。只有 28% 的受检查儿童没有伴随疾病。与此同时，在视力障碍儿童中检测到伴随病理的比例最高。与普通学校的学生相比，中学班的学生患有视觉系统、肌肉骨骼系统和内分泌系统的伴随疾病的比例明显更高。建议在早期阶段预防视力障碍儿童的伴随发病。在进行全面体检时，需要考虑教育机构类型。

关键词：强化教育形式、视力障碍、合并症、发病预防、高中生。

Annotation. 211 children of senior school age were examined to identify chronic pathology. All children were divided into 2 groups, taking into account

the intensity of schooling, which affects the health of students. In schools with a traditional education program, 102 students were examined, and in lyceums with in-depth study of subjects, 109 students were examined. An increased level of chronic pathology in the organ of vision, musculoskeletal system and endocrine system was revealed in all children. However, a comparative analysis of the structure of chronic pathology showed a significantly higher level of diseases of the organ of vision and the musculoskeletal system in the group of lyceum students. In children of both groups, the level of comorbidity averaged 2.2 ± 0.6 concomitant diseases in addition to the main one. The absence of concomitant diseases was recorded in only 28% of the examined children. At the same time, the highest percentage of concomitant pathology was detected in children with visual impairment. Students of lyceum classes have a significantly higher percentage of concomitant diseases from the visual system, musculoskeletal system and endocrine system in comparison with children of regular schools. It is recommended to prevent concomitant morbidity in children with visual impairment in the early stages. When conducting comprehensive medical examinations, it is necessary to take into account the type of educational institution.

Keywords: *intensive forms of education, visual impairment, comorbidity, morbidity prevention, high school students.*

In recent years, there has been a negative trend in the health of the child population [1]. The maximum increase in morbidity in children and adolescents is observed during their studies in educational institutions. Adolescence is the most vulnerable period to the effects of school-related risk factors due to decreased adaptation against the background of physiological pubertal changes [2,3]. In addition, high-intensity forms of education, which are practiced in new types of schools (lyceums, gymnasiums, etc.), sometimes without taking into account possible permissible loads, increase the risk of adaptation disorders in schoolchildren. Chronic stress accompanying this process contributes to the development of maladaptation syndrome with subsequent deterioration of the morphofunctional parameters of the body [4, 5, 6]. Thus, it seems relevant to analyze the health status of children taking into account the influence of various factors in the educational environment.

Purpose of the study: to assess the dynamics of morbidity in high school students depending on school loads of varying intensity.

Materials and methods: The assessment of the health status of students was carried out based on data from preventive medical examinations in secondary educational institutions Ingodinsky district of Chita. The study included 211 schoolchildren aged 15-16 years. Taking into account schools of different types, all schoolchildren were divided into two groups: 102 students were examined in

schools with a traditional education program and 109 students were examined in lyceums with in-depth study of subjects.

The material and technical facilities of the State Budgetary Healthcare Institution “Children’s Clinical Medical Center” in Chita were used.

Statistical analysis of the research results was carried out in the environment Statistica v. 8.0. (StatSoft). To determine the significance of the differences between the compared indicators, corresponding to the law of normal distribution in two samples, the parametric Student’s test was used. Comparison of quantitative characteristics that did not obey the law of normal distribution was carried out using nonparametric Mann-Whitney tests with two unrelated samples. When comparing one pair of values, differences were considered statistically significant if two-sided p values <0.05 .

Results and discussion:

In general, an analysis of chronic pathology in 211 children included in the study revealed an increased level of chronic pathology in the musculoskeletal system, visual analyzer, endocrine system and nutritional disorders (Diagram No. 1).

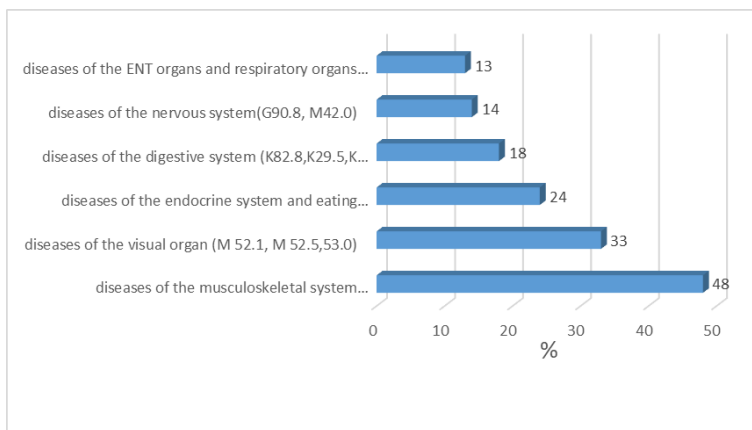


Diagram 1. The structure of chronic pathology in children included in the study.

The proportion of children with diseases of the musculoskeletal system was 48% (rank I), children with diseases of the visual organ - 33% (rank II), endocrine system and nutritional disorders - 24% (rank III), and digestive system - 18% (IV rank place).

Comparative analysis of the structure of pathological changes taking into account schools of different types, he established a higher incidence rate in the group of lyceum children in comparison with students of regular schools. This applies to orthopedic pathology and vision pathology ($p<0.05$). (Diagram No. 2)..

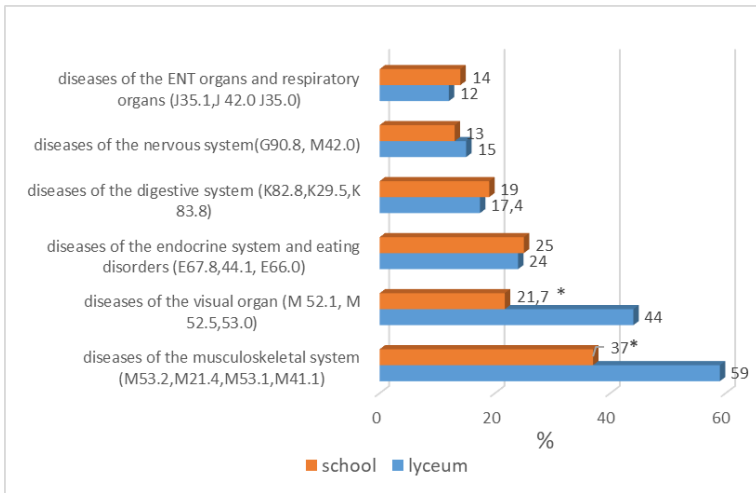


Diagram 2. Comparative characteristics of chronic pathology in children studying in different types of schools.

Note: * - $p < 0.05$

Also, within the framework of this study, a comorbidity analysis was carried out in schoolchildren included in the study. In total, 458 diagnosed diseases were identified in 211 schoolchildren, on average 2.2 ± 0.6 per case, in addition to the main one. The absence of concomitant diseases was recorded in only 28% of the examined children.

At the same time, the highest percentage of concomitant pathology was detected in children with visual impairment (Table No. 1).

Table 1.

The structure of concomitant pathology in children with visual impairment.

Concomitant pathology								Total children with visual impairments
diseases of the nervous system (G90.8, M42.0)		digestive diseases (K82.8, K29.5, K83.8)		diseases of the endocrine system and nutritional disorders (E67.8, E44.1, E66.0)		musculoskeletal diseases apparatus (M53.2, M21.4, M53.1, M41.1)		
n	%	n	%	n	%	n	%	Abs.
10	14.5	14	20	32	46	46	66	69

Note: n - case of disease.

It should be noted that 39 (56%) schoolchildren with vision pathology had 2 or more concomitant diseases.

A comparative analysis of comorbidity in children with vision pathology from different types of schools established a significantly higher frequency of concomitant orthopedic pathology and endocrine disorders in students of lyceum classes ($p < 0.05$) (Table No. 2).

Table 2.

The structure of concomitant pathology in children with visual impairments studying in different types of schools.

Concomitant pathology								Total children with visual impairments	
diseases of the nervous system (G90.8, M42.0)		digestive diseases (K82.8, K29.5, K83.8)		diseases of the endocrine system and nutritional disorders (E67.8, E44.1, E66.0)		musculoskeletal diseases apparatus (M53.2, M21.4, M53.1, M41.1)		Abs.	Establishment
n	%	n	%	n	%	n	%		
3	15	4	20	8	40*	8	40*	20	school
7	14	10	21	24	75	38	77	49	lyceum

*Note: n - case of disease. : * - $p < 0.05$*

Conclusions and conclusion:

1. According to the results of a survey of 211 high school students, an increased level of chronic pathology of the organ of vision, musculoskeletal system and endocrine system with metabolic disorders was noted.

2. A comparative analysis of the prevalence of chronic pathology among students of innovative schools (lyceum) and students of regular schools showed that diseases of the organ of vision and the musculoskeletal system are significantly more common among students of lyceum classes.

3. Analysis of comorbidity among schoolchildren included in the study revealed an average of 2.2 ± 0.6 concomitant diseases per case. The absence of concomitant diseases was recorded in only 28% of the examined children. The largest percentage of concomitant pathology was registered in children with diseases of the organ of vision.

4. A comparative analysis of comorbidity in children with vision pathology was carried out taking into account different types of schools; frequency of concomitant diseases in children with vision pathologies-students of lyceum classes was significantly higher than that of children studying in regular schools.

5. Thus, the results of the study indicate the need to comply with social and hygienic conditions of the daily routine, organization of physical activity and school

loads for children studying in lyceum classes. It is recommended to prevent concomitant morbidity in children with visual impairment in the early stages. When conducting comprehensive medical examinations of students, it is necessary to take into account the type of educational institution.

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Th17/Treg 细胞失衡作为非 LS 肺结节病的诊断和预后生物标志物
**TH17/TREG CELL IMBALANCE AS A DIAGNOSTIC AND
PROGNOSTIC BIOMARKER IN NON-LS PULMONARY
SARCOIDOSIS**

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抽象的。肺结节病是一种复杂的疾病，具有广泛的表现，使其诊断具有挑战性[1]。晚期肺结节病（APS）因其高死亡率而特别令人担忧，并且正在探索新的治疗方案[2]。该疾病具有高度异质性，具有不同的临床表型和肺外表现[3]。肺结节病的诊断需要采用多学科方法，重点是将其与其他疾病区分开来[4]。在结节病中，Th17 细胞及其亚群的可塑性可能导致不同的疾病表型，其中特定亚群可能更具致病性[5]。它们在肺结节病的发病机制中发挥着至关重要的作用，它们与调节性 T 细胞的不平衡对疾病进展具有重要影响 [6]。Th17 谱系及其细胞因子是介导宿主粘膜免疫对肺部病原体的关键作用[7]。本研究的目的是探讨 Th17/Treg 细胞失衡在结节病病程中的作用。我们发现非洛夫格伦综合征患者的 Th17/Treg 比值与病情进展呈正相关。这可以作为该疾病的替代诊断和预后生物标志物。

关键词：结节病； 洛夫格伦综合症； Th17细胞； 调节性T细胞； IL-17A； 肉芽肿； 纤维化。

Abstract. *Pulmonary sarcoidosis is a complex disease with a wide range of manifestations, making it a diagnostic challenge [1]. Advanced pulmonary*

sarcoidosis (APS) is particularly concerning due to its high mortality rates, and new treatment options are being explored [2]. The disease is highly heterogeneous, with different clinical phenotypes and extrapulmonary manifestations [3]. The diagnosis of pulmonary sarcoidosis requires a multidisciplinary approach, with a focus on differentiating it from other diseases [4]. In sarcoidosis, the plasticity of Th17 cells and their subsets may contribute to different disease phenotypes, with specific subsets potentially being more pathogenic [5]. They play a crucial role in the pathogenesis of pulmonary sarcoidosis, with their imbalance with regulatory T-cells having significant implications for disease progression [6]. The Th17 lineage and its cytokines are key players in mediating host mucosal immunity to pulmonary pathogens [7]. The aim of this research was to investigate the role of Th17/Treg cell imbalance in the course of sarcoidosis. We found out that the ratio of Th17/Treg is positively correlated with the progression of the disease in patients with Non-Löfgren's syndrome. This could serve as an alternative diagnostic and prognostic biomarker for the disease.

Keywords: Sarcoidosis; Löfgren's syndrome; Th17-cell; Treg; IL-17A; Granuloma; Fibrosis.

Introduction

Pulmonary sarcoidosis is a complex, heterogeneous disease characterized by noncaseating granulomatous inflammation in the lungs and intrathoracic lymph nodes [8]. It presents with a range of respiratory symptoms and can have a variable clinical course, with some patients experiencing spontaneous remission while others develop chronic, progressive disease [9]. Löfgren's syndrome, a distinct phenotype of sarcoidosis, is characterized by acute onset and a triad of symptoms: bilateral hilar lymphadenopathy, erythema nodosum, and arthritis [10]. This syndrome has a good prognosis and can be diagnosed based on clinical features. In contrast, non-Löfgren's syndrome pulmonary sarcoidosis can present with a range of atypical symptoms, making diagnosis challenging [4].

Sarcoidosis is characterized by the accumulation of lymphocytes and macrophages in the alveoli, leading to granuloma formation. This process is mediated by the activation of macrophages and the development of T cell immunity against specific antigens [11]. T lymphocytes and cytokines play a crucial role in the recruitment, homing, and activity of T cells in the lower respiratory tract of sarcoidosis patients. Several studies have highlighted the involvement of diverse immune cells, including Th17 cells, regulatory T cells, and macrophages, in the pathogenesis of sarcoidosis [12].

Th17 cells and Treg cells, while derived from the same precursor, play opposing roles in immune response. Th17 cells promote inflammation and autoimmunity, while Treg cells maintain immune homeostasis and tolerance. This balance is

influenced by various factors, including signaling pathways, cytokines, and the intestinal microbiota [13]. However, Treg cells can also promote Th17 cell responses to enhance host resistance in certain infections [14].

The clinical course of pulmonary sarcoidosis is variable, with some patients experiencing spontaneous remission while others have a chronic, progressive course. In this study we investigated the role of the Th17/Treg ratio in the pathogenesis of Non Löfgren's syndrome (non-LS) sarcoidosis. Peripheral blood samples were collected from 101 non-LS sarcoidosis patients and 40 healthy controls. We measured Th17 cells levels, regulatory T cells (Tregs). Additionally, we measured the concentration of the pro-inflammatory cytokine (IL-17A), and the anti-inflammatory cytokine (IL-10). Finally, to further verify our findings, we assessed the correlation between the Th17/Treg ratio and the presence of extrapulmonary manifestations and fibrosis in the non-LS patients.

Materials and Methods

Study Design and Participants. We enrolled 101 participants with chronic sarcoidosis (“non- Löfgren's syndrome”) and 40 healthy controls in the study. All diagnoses were confirmed through clinical, radiological (chest CT), and histological examinations (bronchopulmonary tissue/mediastinal lymph nodes biopsy). Radiological classification was used to characterize patient groups according to the recommendations of the American Thoracic Society (ATS), the European Respiratory Society (ERS), and the World Association of Sarcoidosis and Other Granulomatosis (WASOG) [15].

Disease Progression. Clinical disease course was assessed based on the chest CT scan data; detected extrapulmonary manifestations, and severity of pulmonary fibrosis.

Cytokine Levels. Blood plasma cytokine levels (pg/mL) were analyzed by using Milliplex MAP kits (Millipore, USA) along with magnetic microspheres (Milliplex Mag, USA), according to manufacturer's instructions using Luminex MAGPIX instrument (Luminex, USA).

T cell Subsets. T cell subset composition in peripheral blood was assessed by flow cytometry using the Navios diagnostic instrument (Beckman Coulter, Inc., USA), with three lasers with wavelengths of 405, 488, and 638 nm. Data processing was performed using the Navios Software v.1.2, Kaluza™ v.2.0 (Beckman Coulter, USA). For immunophenotyping, various combinations of direct monoclonal antibodies were applied. Lymphocyte levels were presented as: % - percentage of the total number of lymphocytes.

Statistical analysis. The data were analyzed using statistical tests implemented in Python 3.9.12 (2024, Python Software Foundation). Visualizations were created using Matplotlib v3.8.2 (2024, matplotlib.org). The Mann-Whitney U-test was applied to comparisons between two groups. Correlations between dichot-

omous and continuous variables in the same group were estimated based on the Point-Biserial correlation coefficient. For all of the tests, a P value of less than 0.05 was considered to indicate a significant difference.

Results

We observed a significant increase in Th17 levels (Figure 1, $p=0.03$) and a Th17/Treg imbalance (Figure 2, $p=0.003$) in non-LS patients compared to healthy controls which was also supported by the increase of the ratio between their key cytokines IL-17A/IL-10 (Figure 4, $p<0.001$). Additionally, Th17/Treg imbalance positively correlated with both extrapulmonary manifestations (Figure 4, $r=0.4$, $p=0.03$) and fibrosis (Figure 5, $r=0.41$, $p=0.04$) in non-LS patients.

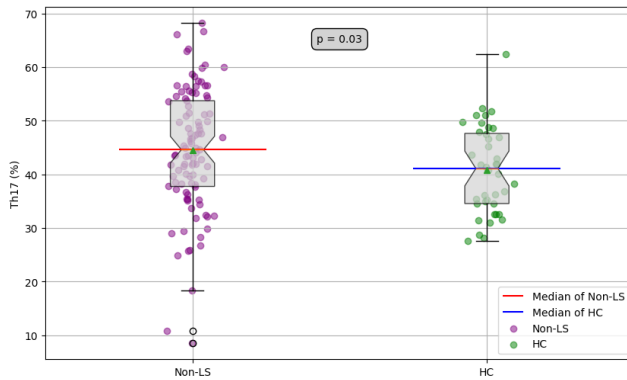


Figure 1. Increased Levels of Th17 (%) in Non-LS Sarcoidosis Patients ($n = 101$) Compared to Healthy Controls ($n = 40$); $p = 0.03$; Mann–Whitney U test

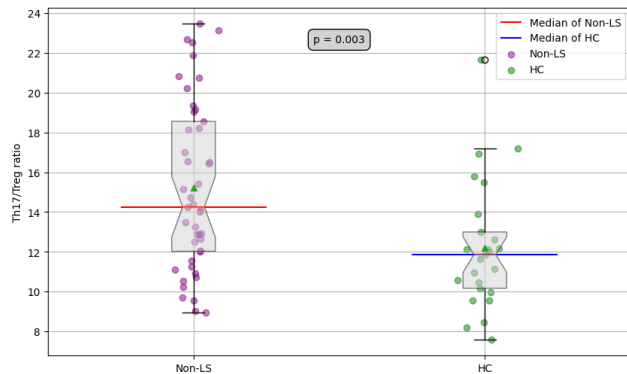


Figure 2. Th17/Treg Imbalance in Non-LS Sarcoidosis Patients ($n = 45$) and Healthy Controls ($n = 25$); $p = 0.003$; Mann–Whitney U test

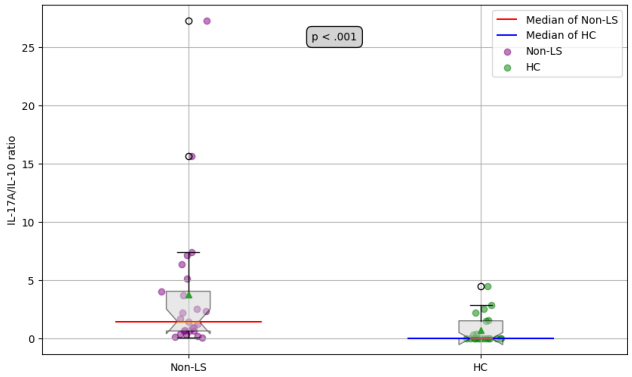


Figure 3. IL-17A/IL-10 Imbalance in Non-LS Sarcoidosis Patients (n = 25) and Healthy Controls (n = 21); $p < 0.001$; Mann–Whitney U test

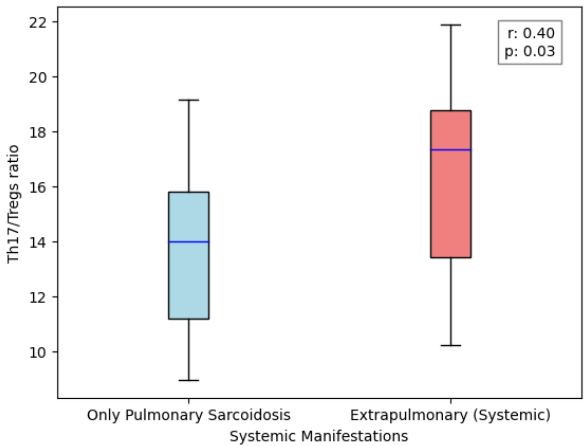


Figure 4. Extrapulmonary (Systemic) Manifestations of Sarcoidosis in Non-LS Patients (n = 31) by Th17/Tregs Imbalance in the Peripheral Blood; $r = 0.4$; $p = 0.03$; Point-Biserial correlation test

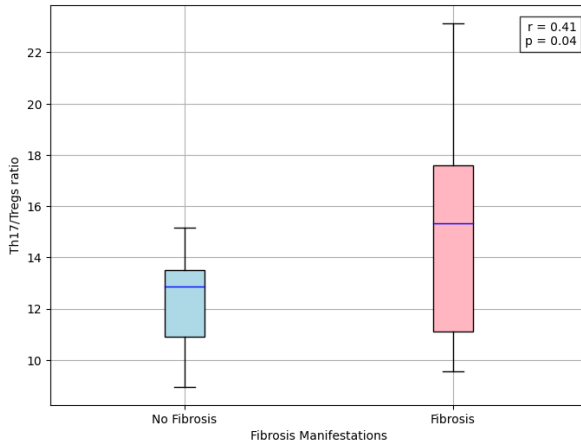


Figure 5. Fibrosis Manifestations in Non-LS Patients ($n = 25$) by Th17/Tregs Imbalance in the Peripheral Blood; $r = 0.41$; $p = 0.04$; Point-Biserial correlation test

Discussion and Conclusions:

Our findings highlight the potential of the Th17/Treg ratio as both a biomarker for disease activity and a target for therapeutic intervention. The positive correlation between the Th17/Treg imbalance and the presence of extrapulmonary manifestations and fibrosis in non-LS patients underscores the potential of this ratio as a biomarker for disease severity and progression. At the molecular level, the balance between Tregs and Th17 cells is maintained by the transcription factors Foxp3 and ROR γ t, which regulate the differentiation and function of these cells [16]. The disruption of this balance, as evidenced by the Th17/Treg imbalance in non-LS sarcoidosis, indicates a potential mechanism by which the disease may progress.

Additionally, given that the imbalance is associated with the pathogenesis of sarcoidosis, our findings support the therapeutic potential for anti-cytokine therapy. Targeting the cytokines that affect this ratio could be a promising therapy.

While our study has shed light on the role of the Th17/Treg ratio in non-LS sarcoidosis, further research is needed to fully elucidate the complex interactions between these immune cells. Future analysis of Th17/Treg ratio in BALF could support our findings.

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Author Contributions:

A.S.F.O.E. — Developing the research route; Data analysis; Writing the manuscript;

N.M.L. — Collected the clinical information and biological samples; analysis of the materials; provided technical direction for experimental methods; Revised the manuscript;

T.P.S. — Coordinator of the project; revised the draft critically; contributed to the conception and design of the research; interpreted the data and results; revised the manuscript.

All authors contributed to the article and approved the submitted version.

Ethical Considerations: This study adhered to the ethical principles outlined in the Declaration of Helsinki (2013), Russian Federation’s “Rules of Clinical Practice” (2003) and “Good Clinical Practice” (2016). All participants provided informed consent.

Data Availability Statement: The data supporting this article will be made available by the authors, without undue reservation.

预防下颌骨折并发症
**PREVENTION OF COMPLICATIONS IN FRACTURES OF THE
LOWER JAW**

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抽象的。本文介绍了 2020 年至 2022 年对 813 名下颌骨折患者进行的一项研究结果。研究了导致下颌骨折并发症发生的因素,其中包括:受害者到医疗机构就诊较晚、诊断错误以及入院前和入院初期不正确的治疗策略。可以推荐用于颌骨骨折固定和治疗的标准绷带作为颌骨骨折固定和固定的附加方法。

关键词:下颌骨折、治疗、标准绷带和固定。

Abstract. *The article presents the results of a study for 2020-2022 of 813 patients with fractures of the lower jaw. Were studied factors leading to the development of complications in fractures of the lower jaw, among them: late presentation of victims to a medical institution, diagnostic errors and incorrect treatment tactics in the pre-hospital and early hospital periods. A standard bandage for immobilization and treatment of jaw fractures can be recommended as an additional method of immobilization and fixation for jaw fractures.*

Keywords: *fracture of the lower jaw, treatment, standard bandage, and immobilization.*

Recently, there has been a tendency towards an increase in the proportion of injuries to the maxillofacial area (from 3 to 8%), and fractures of the lower jaw (LJ), according to some data, amount to 67-92% (in the CIS countries), according to others - 12.2 -70.2% (in foreign countries) of cases. In the Republic of Uzbekistan, the level of victims after road accidents, mechanical and combined injuries at work and at home is quite high (Yusupov S.S., Boymuradov S.A., Bobomuratova D.T., 2018).

The course of the post-traumatic period of mandibular fractures is influenced by various factors, including periodontal diseases, the presence of teeth in the fracture line and unsanitized foci of inflammation, which are potential sources

of infection (Lepilin A.V., Erokina N.L., Prokofieva O.V., Bakhteeva G. R., Rogatina T. V., Zhilkina O. V., Pudov A. N., Spiridonova E. A., Drobyshev A. Y., Bobrinskaya I. G., 2011). Also an unfavorable factor is the influence of the biceps muscle on periodontal tissue (Fleischer GM, 2016). At the same time, it is traditionally believed that the main reasons contributing to the occurrence of complications are the late presentation of victims to a medical institution, diagnostic errors and incorrect treatment tactics in the pre-hospital and early hospital periods (Buzruksoda Z., Akhtamov S., Sherbekova F., 2021; Shashkov V. A. et al., 2021). Often, the occurrence of infectious and inflammatory complications results from an irrational choice of the method of securing fragments. Widely used intraoral orthopedic structures that provide inter-axillary fixation have a number of significant disadvantages, while eliminating their consequences requires long-term rehabilitation measures (Pulatova S. K., 2021; Zoirov T. E. et al., 2019; Zieliński R. et al. , 2020).

Among the problems in providing care to these patients is the lack of standard bandages for immobilization for jaw fractures, as well as difficulties in treating emergency patients with jaw fractures, especially with partial and complete absence of teeth. All this indicates that the issues of improving immobilization methods for fractures of the lower jaw, as well as the reasonable implementation of an interdisciplinary approach, are relevant in modern maxillofacial surgery. The problem of treating patients with fractures of the lower jaw has been studied and continues to be studied in the works of foreign and domestic scientists. Methods of transport immobilization of the jaws were studied through a comparative analysis using the example of injuries received in wartime conditions or during emergency situations (Mitin N.E., Rodina T.S., Strelkov N.N., Zolotova M.I., Volkova V.V., 2018). When a fracture occurs, vessels of different sizes rupture both in the bone itself and in the soft tissues surrounding it. Acute disturbances in the blood supply to the bone lead to persistent blockade of the microvasculature, a sudden drop in intra-osseous pressure, a sharp slowdown in blood flow, tissue hypoxia and ischemic stasis in the capillaries. At the same time, the foci of ischemic damage at the ends of the fragments in the early post-traumatic period do not remain stable. With mobility of fragments, its zones can expand significantly. All this leads to the death of cellular elements with phagocytic activity, as well as to the cessation of the flow of cellular and humoral antimicrobial protection factors into the damaged area with the blood, a decrease in high natural (Dolgoval I.V., Efimov Yu.V., Afanasyeva O.Yu. , Malyukov A.V., Mukhin V.N., 2011). Thus, it is necessary to search for new, more stable methods of conservative orthopedic treatment for fixation of bone fragments (Fleisher G.M., 2016).

Purpose of the study: optimization of treatment of patients with mandibular fractures by improving immobilization methods and an interdisciplinary approach.

Materials and methods. We conducted a retrospective analysis of the medical records of 813 patients undergoing inpatient treatment in the Department of Adult Maxillofacial Surgery of the Tashkent State Dental Institute.

Results of the discussion. Early purulent-inflammatory complications most commonly included bone wound suppuration - 58%, inflammatory infiltrate - 13% and lymphadenitis - 8%. Post-traumatic osteomyelitis was diagnosed in 21% of the remaining patients. Considering that almost all patients with lower jaw fractures were admitted to the hospital without means of immobilizing the jaw fragments, we have developed a standard dressing for transport immobilization for pre-hospital and additional fixation during treatment. It is designed as a monolithic product with openings for the ears, and is fixed on the temporal and occipital parts of the head. It is made of natural materials with increased strength. It can undergo multiple washings and sterilizations without changes in structure. The direction of traction force is adjustable. It does not require time-consuming application. The muscle component when using the standard dressing for immobilization and treatment approximates the numerical range of physiological rest for the lower jaw, and the pain component tends to decrease, as confirmed by the results of assessment on a visual analog scale.

Thus, underestimating the importance of temporary transport immobilization of the lower jaw leads to the development of complications. The practice of many years of treating patients shows that almost all of them, upon admission to the hospital from a clinic or district hospital, are not provided with the proper type of care. Temporary immobilization of the jaw at the prehospital stage allows you to immobilize bone fragments, partially reduce pain, reduce the risk of bleeding, and reduce infection of the fracture gap and the development of inflammatory complications in the form of suppuration of the bone wound and the development of traumatic osteomyelitis.

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农业企业智能可靠供能问题

**PROBLEMS OF RELIABLE INTELLIGENT ENERGY SUPPLY TO
AGRICULTURAL ENTERPRISES**

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抽象的。 本文讨论了俄罗斯远离集中供电网络地区的农业生产者实施新型可再生能源, 以及将传统农村网络现代化为新型智能网络智能农村电网, 以提高能源资源终端消费者的可靠性和效率。 值得注意的是, 俄罗斯农业生产者的可再生能源市场正处于发展的初级阶段, 并且已经有足够数量的小型私营企业使用各种现代技术生产电力和热力的例子 以及该国许多地区的家庭。 值得注意的是, 俄罗斯需要更深入地研究利用智能农村电网技术为小型农业企业和定居点提供可靠电力的问题。

关键词: 智能农村电网、农村配电网、可再生能源、智能电网技术。

Abstract. *This article discusses the implementation of new renewable energy sources in Russia by agricultural producers in areas remote from centralized power supply networks and the modernization of traditional rural networks into new smart networks Smart Rural Grid to improve the reliability and efficiency of the end consumer of energy resources. It is noted that the market for renewable energy sources among agricultural producers in Russia is at the initial stage of its development and there are already a sufficient number of examples of the use of various modern technologies for the production of electricity and heat in small private enterprises and households in many regions of the country. It is noted that in Russia there is a need for a more in-depth study of the issues of reliable power supply to small agricultural enterprises and settlements using Smart Rural Grid technologies.*

Keywords: *Smart Rural Grid, rural distribution networks, renewable energy sources, smart grid technologies.*

Most agricultural enterprises are provided with electrical energy from terminal substations with a voltage of 6-10/0.4 kV of distributed electrical networks of the territorial network organization (TSO) and are located, as a rule, in areas remote from cities and large electrical substations.

Rural electrical networks of TSOs are overhead power transmission lines (OHPLs) of medium voltage 6-10 kV, which are characterized by great wear and long length in rough terrain, often difficult for access and quick operational maintenance of overhead power lines in the event of an emergency on the line. The configuration of rural systems is not easy to change because switches and disconnectors are located in remote locations from service areas and are manually operated. As a result, the power supply to agricultural enterprises and rural settlements around these enterprises is characterized by low reliability, especially in cases of bad weather.

Most agricultural enterprises are small private enterprises for growing, processing and storing agricultural and livestock products, located in small settlements where the employees of the enterprises themselves mainly live. Interruptions in the power supply to such settlements in the event of emergencies in TSO networks, especially in critical weather conditions, when the power supply may be interrupted for several days, affect not only the nature of the production process at the local enterprise and leads to corresponding losses, but also to significant deterioration the comfort of living of the population in these villages and the conditions for their productive work at this enterprise.

To ensure reliable power supply to the most critical consumers and equipment in remote rural areas, low-power diesel generator sets (DGS) are traditionally used, which can operate both in normal mode and in the event of an emergency. To provide heat to production areas and rural infrastructure, local boiler houses using diesel, coal or wood are used. Many local boiler houses and diesel generator sets in these settlements have long expired and require replacement or significant reconstruction. The development and reliability of energy supply to small agricultural production and farms in remote settlements is hampered by technical difficulties and the high cost of reconstructing energy supply systems or building modern reliable centralized energy supply lines and connecting new consumers to them.

The constant increase in tariffs for electricity and heat, as well as the high cost of technological connection to power grids, leads to an increase in the unit cost of energy in the final price of agricultural products and, accordingly, requires the introduction of new energy-efficient technologies and the development of modern highly efficient means of own energy generation to significantly reduce production costs and, accordingly, increasing the profitability of production and improving comfortable working conditions at the enterprise and living conditions for employees and their families.

Improving the energy infrastructure and development of rural areas as one of the most common categories of land in Russia should take place with the maximum use of combined heat and power plants and non-traditional energy sources, taking into account existing energy supply schemes for settlements [1].

Autonomous energy centers with combined production of heat and electricity, due to their high energy efficiency and the possibility of quick installation, have already proven themselves quite well in agriculture [2], and in some cases, when cold is necessary for the production and preservation of agricultural products or carbon dioxide is used to enrich the atmosphere of greenhouses in order to increase the germination of vegetable or flower products, the operating efficiency of cogeneration plants can reach almost 90% [3].

Non-traditional renewable energy sources (NRES) are actively developing in Russia, and the factor of the cost of electricity from renewable sources compared to the cost of electricity from centralized power supply plays an important role in determining the prospects for the use of NRES. In view of the rapid reduction in the cost of renewable energy sources, which has occurred in recent years, and the significant increase in electricity tariffs in a number of regions of Russia, there are a large number of examples of the use of alternative energy where there is the greatest natural potential of renewable energy sources and the highest tariffs for the end consumer for electricity.

Technologies for the production of electricity and heat from solar and wind power plants, the use of biogas and earth energy make it possible to create inexpensive and efficient power plants of small capacity - from tens of kW to several MW, to reduce consumer costs for electricity by bringing generation closer to places of consumption, to ensure reliability and accessibility energy supply at an affordable cost. The development of the renewable energy market in rural areas of Russia is at the initial stage of its development, however, there are already a sufficient number of examples of the use of various modern technologies for the production of electricity and heat in many regions of the country with different natural conditions, as a rule, these are relatively small private enterprises and households [4].

The growing environmental awareness of the population and the formation of civil society's demand for a favorable environment with the minimum possible negative anthropogenic effect motivates energy companies to switch to environmentally friendly, more energy efficient technologies. At the same time, the leveled cost of electricity from renewable sources under an optimistic scenario for the development of renewable energy sources in Russia, compared to the leveled cost of traditional generation, will cost 1.5–3 times cheaper than traditional generation in Russia [5].

Currently, under the influence of the transition to intelligent management and low-carbon energy, a new model is actively developing, qualitatively changing management processes in the electric power industry - electric energy storage systems (ESS), which open up new opportunities for improving economic indicators and improving the quality of management of end-consumer regimes, especially

in systems using renewable energy, increasing the stability and reliability of their energy supply. Energy storage systems technologies are one of the fastest growing sectors of the electric power industry and the most promising high-tech market in the world [6].

The rapid development of modern technologies for the efficient production of electrical and thermal energy, as well as means of energy storage, poses many tasks of developing and creating a choice of the optimal structure of generating capacities and optimal energy consumption of the end consumer located in an area remote from the centralized energy supply, tasks of creating intelligent control systems for generation and consumption modes to optimize the balance of energy resources, as well as issues of interaction and communication between local generation and the external network in order to increase the reliability, cost-effectiveness and energy efficiency of micro- or mini-energy systems that have developed in the new conditions, operating in a local area and the natural conditions corresponding to this area.

Traditional rural networks are gradually being transformed, a new paradigm for the architecture of rural distribution networks is being developed for subsequent modernization into new networks, the so-called Smart Rural Grid, where the proposed architecture allows for more efficient use of automated and decentralized energy distribution systems in rural areas with the possibility of integrating new distributed energy resources into centralized power supply network. Smart Rural Grid is derived from the more general concept of the Smart Grid energy supply system, which manages generation and consumption using advanced information technologies, which allows real-time monitoring and control of equipment operating modes to maintain an optimal balance in the network in order to ensure reliability and energy efficiency local system [7].

These developing energy systems of the future are usually called small distributed generation, micro-grids, mini-grids or “smart” grids [8]. The global market for small distributed generation technologies, storage and energy efficiency under the general name Smart Grids is growing at a rate of about 6-9% per year. It is expected that by 2025, the volume of commissioned distributed generation capacity will exceed the volume of commissioned centralized generation by three times. According to the International Energy Agency, Smart Grids will provide up to 75% of new connections during global electrification until 2030 [9].

The efficiency of distributed generation of rural consumers using various renewable sources of electricity is influenced by a wide variety of factors, depending on the nature and modes of production of agricultural products, the geographical location of the Russian region, climatic and weather conditions in the region, the availability of minerals and natural resources, the cost of purchase and transportation fuel for generating installations, the level of tariffs for the purchase of elec-

trical and thermal energy, the location and operating modes of energy sources, modes of energy consumption on a daily and annual basis, the topology of existing electrical, heat and gas distribution networks [10].

The development of distributed electrical networks with the participation of renewable energy sources requires completely new approaches to the selection of generating equipment, its operation in normal and emergency modes to ensure a balance of generation and load. The new technological capabilities of such a consumer of energy resources must be supported by a new information environment that makes it possible to automate the collection of data on the operation of generation and load consumption, and on the basis of automatic, including those using artificial intelligence, control systems - to quickly make decisions about changing it, taking into account the current balance situation in Smart Rural Grid and the price situation in the retail electricity market.

The development and mass application of renewable and distributed generation in rural areas leads to an increase in the active role of consumers in managing their own networks and the emergence of new players in the field of energy generation and storage. Such a technological revolution requires the development of new mechanisms to ensure flexible, stable and efficient operation of electrical networks, their planning and increased reliability while modernizing them in such a way that the networks become smart and bring great economic benefits to consumers [11]. Thus, the German Energy Agency in its study shows that the development of the Smart Rural Grid “Energiewende” until 2030 entails investments of 27.5 to 42.5 billion euros and, accordingly, huge economic benefits with the necessary costs of strengthening networks [12].

The principle of managing a micro-energy network can be applied in an infrastructure such as the Internet of Energy, which becomes feasible as technologies develop that can reliably and efficiently ensure the operation of information management systems. Technologies of the Internet of Things, big data analytics, digital twins and virtual power plants, the development of new digital platforms and business models for managing backbone and regional high-voltage electric networks are actively developing in Russia. A large number of scientific works are devoted to these technologies. However, the problems of ensuring the reliability and efficiency of development of rural consumers in modern conditions of the development of technologies with the participation of renewable energy sources in Russia are given unreasonably little attention and, of course, the tasks of in-depth study of reliable power supply to small agricultural enterprises and settlements using Smart Rural Grid technologies should be intensified.

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Se和I对不同块根作物微绿植物初始生长发育参数的影响
**EFFECT OF SE AND I ON INITIAL GROWTH AND
DEVELOPMENT PARAMETERS OF MICROGREENS OF
DIFFERENT ROOT CROP SPECIES**

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注解。 本文研究了硒和碘对不同类型块根作物微绿植物初期生长发育的影响。 亚硒酸钠和碘化钾溶液(单独使用和一起使用)对甜菜和萝卜的芽和根的长度具有类似的影响。 然而,微量元素对甜菜和萝卜种子的实验室发芽参数和发芽势的影响不同。 例如,“KI 0.01%”选项对萝卜的发芽和发芽势有抑制作用,而对于甜菜,仅对发芽有抑制作用,对发芽势有刺激作用。 在“Na₂SeO₃ 0.01%”组中,对甜菜和萝卜的发芽有抑制作用,但只有甜菜对发芽能有抑制作用。 在总结甜菜和萝卜实验室实验中获得的所有数据时,发现对微绿植物的初始生长和发育最常见的刺激作用是“Na₂SeO₃ + KI 0.01%”和“Na₂SeO₃ + KI 0.005%”变体。

关键词: 硒、碘、微型蔬菜、甜菜、萝卜。

Annotation. *The article studied the influence of Se and I on the initial growth and development of microgreens of different types of root crops. A similar effect of solutions of sodium selenite and potassium iodide (both separately and when used together) on the length of the sprout and root of beets and radishes was established. However, different effects of microelements on the parameters of laboratory germination and germination energy of beet and radish seeds were revealed. For example, on the option “KI 0.01%” an inhibitory effect on germination and germination energy of radish was noted, while for beets, an inhibitory effect was noted only on germination, and a stimulating effect on germination energy. In Group «Na₂SeO₃ 0.01%” showed an inhibitory effect on the germination of beets and radishes, but only beets had an inhibitory effect on germination energy. When summarizing all the data obtained in laboratory experiments with beets and radishes, the most often stimulating effect on the initial*

growth and development of microgreens was noted in the “Na₂SeO₃ + KI 0.01%” and “Na₂SeO₃ + KI 0.005%” variants.

Keywords: *selenium, iodine, microgreens, beets, radishes.*

The problem of joint deficiency of selenium and iodine is typical for many regions of our planet. Various existing correction methods, for example, eating iodized salt, do not fully solve this problem at the global level [1].

Regular consumption of foods deficient in selenium can cause serious health problems such as epilepsy, conditions associated with oxidative stress, infertility and immune system disorders. Selenium deficiency plays a key role in various metalloenzyme systems in the body and is best known for its function in the activity of the antioxidant glutathione peroxidase [2]. Selenium has a narrow range between necessity and toxicity, and its use in elevated concentrations can have negative effects on living organisms [3].

Iodine deficiency can lead to the development of hypothyroidism, which can negatively affect brain development, especially in the early stages. In pregnant women, severe iodine deficiency leads to miscarriages and stillbirths. Children of mothers with iodine deficiency are at risk of cognitive disability. Children with poor mental development due to iodine deficiency may have cretinism and dementia. Hypothyroidism and goiter can occur at any age. Endemic cretinism is often characteristic of iodine-deficient areas [4,5].

A relevant and effective strategy for combating iodine and selenium deficiency may be agronomic biofortification of cultivated plants, for example, root crops, which the population actively consumes as food. Considering the joint work of iodine and selenium in maintaining the functions of the thyroid gland, the joint biofortification of these elements will be even more relevant in areas of deficiency of both elements [1].

Despite successful efforts by some countries to combat selenium and iodine deficiency, problems caused by insufficient levels of these nutrients still persist in some regions. This may be due to the lack of appropriate legislation, insufficient knowledge about the problem, deficiencies of selenium and iodine in soils, or the misconception that food fortification will negatively affect their taste or color [6,7,8].

The most relevant area of biofortification is the cultivation of microgreens using the seed soaking method, which has a number of advantages compared to other methods [9,10].

To assess the influence of Se and I on the initial growth and development of microgreens, the following root crops were selected as objects: radishes of the Zhara variety and table beets of the Bordeaux variety. To sow the seeds of the selected crops, vessels filled with 200 g of soil with an initial content of Se and I <1

µg/kg were used. The duration of germination was 2 weeks in climatic chambers Growth Chamber-GC-1000, with a relative air humidity of 80%, a light mode of 10/14, and a temperature in the lighted time of 24 ° C and not illuminated 18 ° C, with daily watering of 50 ml of distilled water per vessel. The experiment was carried out in six repetitions according to the following scheme:

1. Control (seeds soaked in distilled water);
2. Na₂SeO₃ 0.01% (in terms of Se);
3. Na₂SeO₃ 0.005% (in terms of Se);
4. KI 0.01% (in terms of I);
5. KI 0.005% (in terms of I);
6. Na₂SeO₃ 0.01% + KI 0.01%;
7. Na₂SeO₃ 0.005% + KI 0.005%.

On the third day of germination, the germination energy and laboratory germination of seeds were taken into account, and on the fourteenth, the lengths of sprouts and roots were measured. To determine laboratory germination, GOST 12038-84 “Crop Seeds” was used. Methods for determining germination.»

Germination energy and laboratory germination of beet (Fig. 1) and radish (Fig. 2) seeds are presented below.

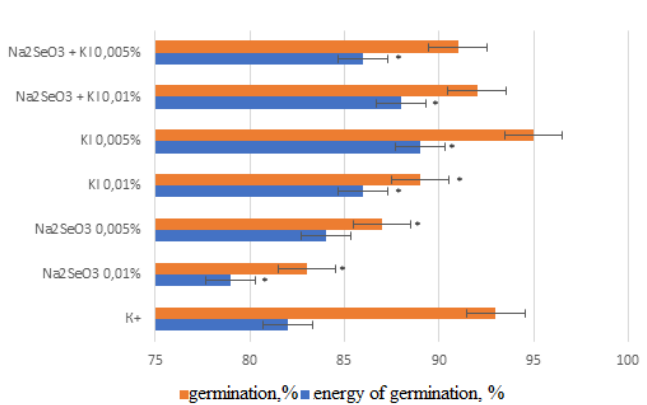


Figure 1. Effect of solutions of selenium and iodine compounds on the germination and germination energy of beet seeds

Note: * – significance of differences compared to control ($p < 0.05$).

In terms of seed germination, significantly significant decreases relative to the control were established for the options: “KI 0.01%”, “Na₂SeO₃ 0.005%” and “Na₂SeO₃ 0.01%”. The germination energy of beet seeds significantly decreased compared to the control in the “Na₂SeO₃ 0.01%” group, and increased in the

“KI 0.01%”, “KI 0.005%”, “Na₂SeO₃ + KI 0.01%” and “Na₂SeO₃” groups + KI 0.005%.” Reliably significant differences in both indicators were obtained only for two options “Na₂SeO₃ 0.01%” and “KI 0.01%”. At the same time, laboratory germination decreased compared to the control by 12 and 4.3%, respectively. This may indicate inhibition of the germination of beet seeds when they are soaked in a solution of sodium selenite with a concentration of 0.005% and 0.01% and potassium iodide 0.01%. Solutions of potassium iodide with a concentration of 0.01% and 0.005% and mixed solutions of sodium selenite and potassium iodide with a concentration of 0.01% and 0.005% had a stimulating effect on the germination energy of beet seeds. The best option is “KI 0.005%”, while the germination energy is 8.5% higher than the control.

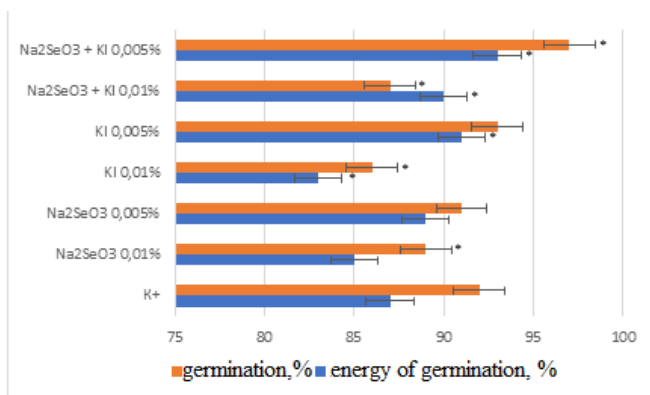


Figure 2. Effect of solutions of selenium and iodine compounds on the germination and germination energy of radish seeds

Note: * – significance of differences compared to control ($p < 0.05$).

The germination of radish seeds differed significantly compared to the control on the “Na₂SeO₃ + KI 0.005%” variants with an increase in the indicator, for the “Na₂SeO₃ + KI 0.01%”, “KI 0.01%” and “Na₂SeO₃ 0.01%” variants with a decrease in this indicator. Germination energy differed significantly in the “KI 0.01%” groups with a decrease and increase in the indicator in the “Na₂SeO₃ + KI 0.005%”, “Na₂SeO₃ + KI 0.01%” and “KI 0.005%” variants. A stimulating effect on both indicators was noted in the “Na₂SeO₃ + KI 0.005%” option, while in the “Na₂SeO₃ + KI 0.01%” option, a stimulating effect was noted only on germination energy, but a depressing effect on germination. The inhibitory effect on both indicators was established in the “KI 0.01%” option, while when using iodine compounds with a lower concentration “KI 0.005%”, a stimulating effect on ger-

mination energy was noted. In the “Na₂SeO₃ 0.01%” group, only a stimulating effect on the germination of radish seeds was noted. Under the conditions of this experiment, the best option is “Na₂SeO₃ + KI 0.005%”, while the germination energy of radish seeds and laboratory germination are higher compared to the control by 6.9 and 5.4%, respectively.

At the end of the experiment, changes in the length of roots and sprouts of beets and radishes were analyzed when using the microelements of selenium and iodine. The data is presented in Figures 3 and 4.

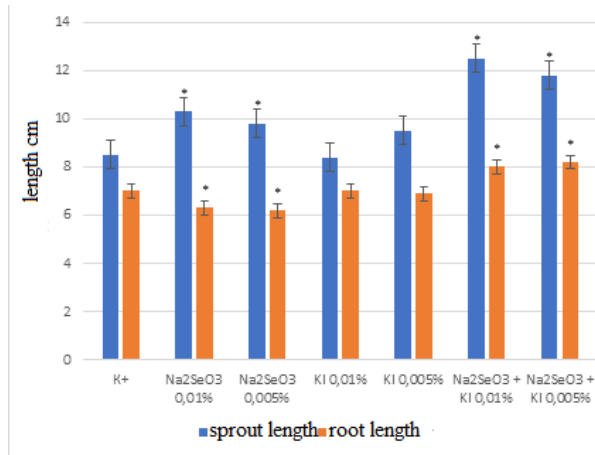


Figure 3. Effect of solutions of selenium and iodine compounds on the length of beet roots and sprouts

Note: * – significance of differences compared to control ($p < 0.05$).

In the variants “Na₂SeO₃ 0.01%” and “Na₂SeO₃ 0.005%”, significant differences were established in terms of sprout height in the direction of increasing the indicator and root length in the direction of decreasing the indicator. In the groups “Na₂SeO₃ + KI 0.01%” and “Na₂SeO₃ + KI 0.005%”, significant differences in the direction of increasing indicators were revealed for both indicators. From the data obtained, it follows that in the groups with mixed solutions “Na₂SeO₃ + KI 0.01%” and “Na₂SeO₃ + KI 0.005%” there is a stimulating effect on both the length of the sprout and the length of the root, while in the variants “Na₂SeO₃ 0.01%” « and «Na₂SeO₃ 0.005%» a stimulating effect is noted only on the length of the sprout, but at the same time an inhibitory effect is observed in relation to the length of the root. Thus, when assessing the effect of selenium and iodine compounds, the combined effect of microelements turned out to be most effective. At the same time, in the “Na₂SeO₃ + KI 0.01%” variant, the length of the sprout and root are higher compared to the control by 47 and 14.5%,

respectively. In the “Na₂SeO₃ + KI 0.005%” option, these indicators exceed the control level by 39 and 17.1%, respectively.

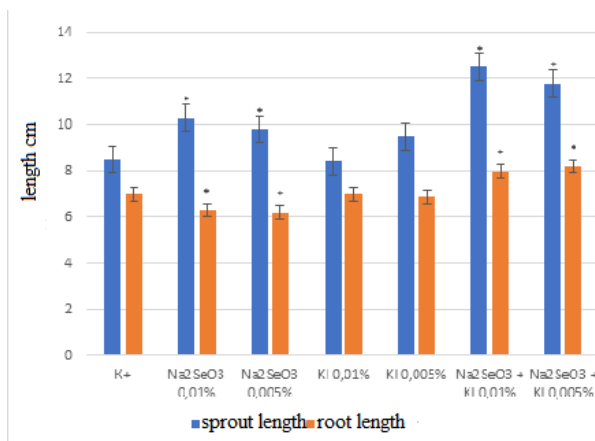


Figure 4. Effect of selenium and iodine solutions on the length of the radish root and sprouts

Note: * – significance of differences compared to control ($p < 0.05$).

The results for the indicators of sprout length and root length are similar to the results obtained in the experiment with beets for the same indicators in the groups “Na₂SeO₃ + KI 0.01%” and “Na₂SeO₃ + KI 0.005%”. However, no reliably significant differences in root length were established in the “Na₂SeO₃ 0.01%” and “Na₂SeO₃ 0.005%” groups, which indicates the absence of an inhibitory effect on this indicator, as in the variants with beets.

Thus, a similar effect of solutions of sodium selenite and potassium iodide (both separately and when used together) on the length of the sprout and root of beets and radishes has been established. However, different effects of microelements on the parameters of laboratory germination and germination energy of beet and radish seeds were revealed. For example, on the option “KI 0.01%»An inhibitory effect on germination and germination energy of radish was noted, while for beets, an inhibitory effect was noted only on germination, and a stimulating effect on germination energy. In Group «Na₂SeO₃ 0.01%” showed an inhibitory effect on the germination of beets and radishes, but only beets had an inhibitory effect on germination energy.

When summarizing all the data obtained in laboratory experiments with beets and radishes, the most often stimulating effect on the initial growth and development of microgreens was noted in the “Na₂SeO₃ + KI 0.01%” and “Na₂SeO₃ + KI 0.005%” variants.

Thus, this study proves the effectiveness of the combined action of iodine and selenium solutions, in comparison with the separate effect of each element on the initial growth and development of radishes and beets.

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农业副产品合理利用前景

**PROSPECTS FOR THE RATIONAL USE OF SECONDARY
PRODUCTS OF THE AGRICULTURAL INDUSTRY**

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注解。现代集约化技术在其生产周期中往往忽视了次级非商品产品的合理使用。利用有机物含量高的农业副产品，目前可以进一步深化食物链，包括将其纳入蘑菇的工业生产中。研究发现，考虑到基本产品生产的现有数据，俄罗斯每年生产7320万吨粪便和12834万吨粪便。吨植物残留物可进一步合理用于蘑菇生产。考虑到监管方法，利用农作物和畜牧业（牛养殖）的二次资源可生产多达2015.4万吨蘑菇，这超出了其目前工业产量的134.36倍。如果将植物残体和畜牧业废物完全纳入蘑菇种植的生产周期，每年可以为俄罗斯额外创造24184.8亿卢布的适销产品。由于食用菌生产中副产品中有机物的自然减少，副产品量由最初的粪便量减少到2196万吨。施用有机肥可节省成本，全国可节省高达136.7亿卢布。在基本农产品生产方面。

关键词：农业、废弃物、资源节约、蘑菇种植、生产效率。

Annotation. *Modern intensive technologies, in their production cycle, often ignore the rational use of secondary, non-commodity products. Using the obtained by-products of agriculture, which have a high content of organic matter, it is currently possible to further deepen the food chain, including it in the industrial production of mushrooms. The study found that, taking into account the available data on the production of basic products, 73.2 million tons of manure*

and 128.34 million tons of manure are produced annually in Russia. tons of plant residues that can be used for further rational use in the production of mushrooms. Taking into account the regulatory method, it is possible to produce up to 20.154 million tons of mushrooms from the secondary resources of the crop and livestock industry (cattle cultivation), which exceeds the current volume of their industrial production by 134.36 times. From plant residues and animal husbandry waste, if they are fully included in the production cycle of mushroom cultivation, it can lead to additional creation of marketable products for 2,418.48 billion rubles annually on the scale of Russia. Due to the natural reduction of organic matter in by-products in the production of mushrooms, the volume of by-products is reduced to 21.96 million tons, from the initial amount of manure. Cost savings on the application of organic fertilizers will allow saving up to 13.67 billion rubles nationwide. in the production of basic agricultural products.

Keywords: *agriculture, waste products, resource conservation, mushroom farming, production efficiency.*

Introduction

Modern intensive agriculture is aimed at achieving maximum productivity of crop cultivation in terms of the production of marketable products while simultaneously increasing labor productivity and profitability of economic activity.

At the same time, as a rule, modern technologies, in their production cycle, ignore the rational use of secondary, non-commodity products. So, when growing grain crops, straw is often scattered in the fields of cultivation during harvesting, which is especially often used in production using the “strip-till” or “no-till” technologies. Also, when growing livestock products, waste products of livestock in the form of manure are often used by enterprises themselves only as organic fertilizers [1]. Thus, modern agriculture uses a simple food chain for food production, which does not fully reveal the full potential of using the resulting biomass, which can be used to rationalize and deepen production and processing [2].

Thus, according to Forbes [3], as of the first half of 2023, there were 18.3 million cattle in Russia. Moreover, in recent years there has been a tendency to increase the production of livestock products on large industrial farms. Also, the total production of grain products is 142.6 million tons [4], which, during production, also creates by-products in the form of straw and other waste, which also require rational use. With the direct utilization of the obtained by-products as organic fertilizers, agricultural producers lose the opportunity to obtain additional profit from it, without including other types of goods in the rational transformation and inclusion in the technological cycle of production [5].

Using the obtained by-products of agriculture, which have a high content of organic matter, it is currently possible to further deepen the food chain, including it in the industrial production of mushrooms.

The purpose of the research is to consider the prospects of introducing waste recycling of crop and livestock products into widespread production in mushroom cultivation with calculations to increase efficiency.

Material and methods of research

In the course of the study, based on statistical data on the production of crop and livestock products in Russia for 2023, the calculation of the possibility of growing mushrooms and increasing the efficiency of economic activities of enterprises was carried out. When calculating the production efficiency, a calculation method was used using automatic process charts [6]. At the same time, the cost savings for applying organic fertilizers (manure and straw residues) to the soil in comparison with the initial volume of material and their residues after inclusion in an additional production cycle were considered as a criterion of economic effect. The output of by-products of livestock and grain production was calculated based on the normative method. Also, the normative method was used to calculate the loss of biomass of secondary products in the production of mushrooms.

Results

Considering that the average annual yield of manure from a unit of cattle is 4 tons, its total production in the country will be (18.3 million heads of cattle * 4 tons of manure / year) 73.2 million tons. In accordance with agronomic practice, if it is used as an organic fertilizer, fresh manure is not applied due to There is a high probability of the awakening of undigested weed seeds, as well as increased concentrations of ammonia compounds, which, with large one-time rates of application to the soil, can lead to burns of the root system of cultivated plants or their excessive vegetative growth.

The production of plant residues in crop production, when growing grain in volumes of 142.6 million tons, taking into account the yield coefficient equal to 0.9 (for all cereals, including corn), is 128.34 million tons Today, except for the use of straw as bedding for animals, and in some cases as coarse feed, as well as in exceptionally small in volumes for the production of oyster mushrooms, straw residues are practically not used and are considered production waste. As a result, unused straw is scattered in the growing fields.

However, despite the fact that in the modern agricultural system (“no-till” and “strip-till” technologies) such use of plant residues is considered useful and leads to an increase in soil fertility, it also has a number of significant disadvantages. Firstly, spores of fungi that are pathogenic to crops remain on them. Secondly, straw residues, during decomposition and in the process of humification, require an increased content of nitrogen compounds for the normal microbiological cleavage of lignin and fiber, which, often, are extracted from the soil by microorganisms themselves, which leads to its deficiency and, as a result, a decrease in the yield of subsequent crops, if nitrogen is not compensated in the form of additional

fertilizing. Thirdly, when collecting straw from the fields, some of the weed seeds are also removed, which, if not removed, germinate, and increase the subsequent clogging of the fields.

The solution to the described problems may be to create a global, nationwide, system for the production of additional mushroom products, in the form of a chain of rational use of plant and livestock waste – mushrooms. The production of such valuable products is not significant today and there are no significant mushroom production complexes in the country that would ensure a high percentage of rational additional use of secondary agricultural products.

It is known that during the production of mushroom products, the yield of mushrooms from the total biomass is 10% [7]. This is on the scale of the all-Russian volume of secondary products:

$$\frac{73.2 \text{ million tons of manure} + 128.4 \text{ million tons of straw}}{100\%} * 10\% = . \quad (1)$$

20.154 million tons of mushrooms

Taking into account the production of mushrooms in 2023 in the amount of 150 thousand tons, the prospective volume of mushroom farming based on the processing of secondary resources will exceed the existing volumes by 134.36 times.

From the point of view of environmental ecology, the splitting of organic matter due to microbiological processes leaves a so-called carbon dioxide trace, which, with a simple production chain, is completely transferred to the main products [8]. In the production of mushrooms and the creation of new food products, the volume of this negative parameter per unit of total output will decrease significantly. This, accordingly, increases the rational use of all agricultural products and from the point of view of ecology.

In addition, with regard to environmental tensions, in the field of animal husbandry, before using manure as an organic fertilizer, it is necessary to form specialized temporary waste storage sites, and preserve manure for at least two to three years (for guaranteed death of weed seeds and spores of fungi pathogenic to plants). When using waste in the production of mushrooms, the waste undergoes mandatory treatment and temperature disinfection, which in the flow mode reduces the need for the area of land allotments for such sites.

From an economic point of view, with a weighted average price for mushrooms (oyster mushrooms and champignons) with a wholesale release from production of approximately 120 rubles / kg, the inclusion in the production of a new cycle of secondary products in mushroom farming can lead to the creation of marketable products in the amount of (20.154 million tons of mushrooms * 120 rubles/kg) 2418.48 billion. rub . Naturally, such calculations are approximate and

with an increase in the volume of production of mushroom products, the price for it will change, and also a similar cycle of processing of crop and livestock waste may not be fully carried out.

In addition, from the point of view of the economics of production, since the application of organic fertilizers to fields is also a resource-intensive process, it is possible to make a forecast calculation of cost savings for it, taking into account the reduction in the mass of fertilizers applied in the form of a spent mushroom substrate. It is known [9] that after the production of mushrooms, the volume of organic ingredients of the substrate is reduced to 30% of the initial one. That is, in the case of waste from the livestock industry, the initial volume of 73.2 million tons will decrease to:

$$\frac{73.2 \text{ million tons of manure}}{100\%} * 30\% = 21,96 \text{ million tons of organic fertilizers.} \quad (2)$$

If we take into account the types of work and the standards for their implementation, then it is possible to carry out a simple calculation of the costs of performing work on the introduction of organic fertilizers on the basis of technological maps. This calculation is shown in Table 1. As can be seen, only by changing the mass of the substrate, at least 13.67 billion rubles will be saved annually on preparatory work for the introduction of organic fertilizers. It can also have a beneficial effect on the further development of the agricultural sector.

Table 1.

Calculation of the cost of applying organic fertilizers depending on the volume.

Types of work	Costs, million rubles.		
	Cattle manure, 73.2 million tons	Mushroom substrate, 21.96 million tons	Difference
Loading of organic fertilizers	1693,21	507,96	1185,25
Delivery of organic fertilizers	14480,16	4344,05	10136,11
Drilling of organic fertilizers	1666,92	500,08	1166,84
Loading of organic fertilizers into spreaders	1693,21	507,96	1185,25
Spreading of organic fertilizers	2787,30	2787,30	0,00
The amount	22320,80	8647,35	13673,45

Thus, on the basis of the above calculated data, the introduction of additional technologies for the rational use of secondary non-commodity agricultural products will increase production efficiency by not only creating a new social product, but also by saving costs for performing work in an existing production. This will further reduce the cost of production of primary agricultural products.

Conclusions

1. During the calculations, it was found that, taking into account the available data on the production of basic products, 73.2 million tons of manure and 128.34 million tons of plant residues are produced annually in Russia, which can be used for further rational use in the production of mushrooms.
2. Taking into account the regulatory method, it is possible to produce up to 20.154 million tons of mushrooms from the secondary resources of the crop and livestock industry (cattle cultivation), which exceeds the current volume of their industrial production by 134.36 times.
3. The production of mushroom products from plant residues and animal husbandry waste, in case of their full inclusion in the production cycle of mushroom cultivation, may lead to additional creation of marketable products for 2,418.48 billion rubles annually on the scale of Russia.
4. Due to the natural reduction of organic matter in by-products in the production of mushrooms, the volume of by-products is reduced to 21.96 million tons, from the initial amount of manure. Cost savings when applying it as organic fertilizers will allow saving up to 13.67 billion rubles nationwide. in the production of basic agricultural products.

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