



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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金砖国家15/2023峰会：从非洲议程到制度演变，再到新成员参与结构的形成
**BRICS, 15/2023 SUMMIT: FROM THE AFRICAN AGENDA TO
INSTITUTIONAL EVOLUTION AND TO THE FORMATION OF A
STRUCTURE FOR THE INVOLVEMENT OF NEW MEMBERS**

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抽象的。作者分析了2023年8月底在约翰内斯堡举行的金砖国家领导人第十五次峰会的结果，这次峰会成为一个转折点和周年纪念日。该一体化平台进一步发展的主要假设将在参与国签署的宣言框架内提交供公众讨论，并基于参与扩大该协会过程的各参与者代表所表达的各种想法。为整合共同体领导层向俄罗斯的过渡做准备一年。作者提出了对盎格鲁撒克逊霸权影响力的地缘政治议程当前挑战的整体反作用的假设，该议程应逐渐被其他国家的替代性和更公平的“游戏规则”和创造性的共同创造所取代。遵循联合国可持续发展目标，以国际法基本原则为基础，不断进一步巩固各种类型的经济体，同时从根本上将它们融入一个机会平等和负责任选择的多中心和多极世界。

关键词：俄罗斯、ADF、乌克兰、南非、印度、中国、巴西、美国金砖国家、外国直接投资、亚太、KUAD、北约、AUCUS、NBICS、金砖国家、双耦合、人工智能、大数据、工业4.0、Bigtech、“技术诀窍”，非洲，世贸组织。

Abstract. *The authors analyze the results of the 15th BRICS summit, held at the end of August 2023 in Johannesburg, which became a turning point and anniversary. The main postulates of the further development of this integration platform are submitted for public discussion within the framework of the signed Declaration of the participating states and are based on the various ideas expressed by representatives of various actors involved in the process of expanding this association and in preparing the transition of leadership for a year in the integration community to Russia. The authors put forward hypotheses on the integral counteraction to the answers to the current challenges of the geopolitical agenda of the hegemonic Anglo-Saxon influence, which should gradually be replaced by alternative and fairer “rules of the game” and creative mutual creation of other states working in the wake of the UN SDGs, based on the basic principles of international law and in the ongoing further consolidation of various types of economies while fundamentally integrating them into a polycentric and multipolar world of equal opportunities and responsible choices.*

Keywords: *Russia, ADF, Ukraine, South Africa, India, China, Brazil, US BRICS, FDI, Asia-Pacific, KUAD, NATO, AUCUS, NBICS, BRICS, dicoupling, AI, Big Data, Industry 4.0., Bigtech, “know-how”, Africa, WTO.*

The next BRICS summit and signed on August 23, 2023 in Santon, in Gauteng, in South Africa, upon its completion, the final Johannesburg Declaration, which held 3 days of the 15th summit from the date of its foundation, confirmed the commitment to the Bretton Woods agreements (which, as expected, could allow, on the part of the Anglo-Saxon monetary and legal hegemony, to participate in the institutions and in the governing bodies for the implementation of the global monetary policy of these agreements, developing countries and emerging markets that are trying to become independent and define themselves as the basic sovereign actors of the new emerging of the world order), which are fully recognized by the BRICS member countries and are considered the main and basic determinants in the world of the future and in the field of transformation of the IMF itself (push the 16th General Review of IMF quotas by 15.12.2023), and, in the future, with the full primacy of the WTO (with its special and differential regimes) over world trade (talking about an alternative to the WTO or a new vision of GATT-2.0., zonal trade areas or alternative currencies in settlements outside the WTO territories or in offshore jurisdictions or any other, for example, TOPs (territories of advanced development) was never included in the declaration and remained a good wish and only in the form of ignored questions from journalists to the leaders of the “brick world” (BRICS is bricks in English translation), and to the new tasks of the G20, and to the expected UN reform, especially the UN Security Council itself, which should be modified after the proclaimed entry into it of India, Brazil, South Africa and the countries of Africa, Asia and Latin America [1;2].

At the same time, no decisions on the creation and introduction of new currencies for all the years of the BRICS have allowed themselves to be launched in the zones and spheres of their influence, such as, for example, Africa (the idea of the “African gold dinar” by M. Gaddafi) or the Middle East (the idea of “gold oil dinar” by S. Hussein), while allowing their states to test the pool of BRICS foreign exchange reserves “to mitigate the consequences of future crises” for the 6th time before the end of 2023 (paragraph 50). At the same time, only wishes (paragraph 48) to overcome the growing shortage of financial investments in the infrastructure of the BRICS, which must learn to find and apply such mechanisms on its own and develop uniform rules by which it will be possible to resolve the issue of “using public resources to stimulate the inflow of private capital, experience and efficiency” into critical nodes of the common development potential of the countries of the integration association have not yet found implementation in the specifics of the algorithms for the sequence of actions and in the writing of “road maps” of a single infrastructure [1;3]. China is especially active here, lobbying for the global status of the yuan not only as a reserve currency for a number of global markets and trade operations, but also as a base for any integration currency capable of protecting industries and territories of its national interests. And it is precisely this growing aspiration that says that both Russia and China will be able to support each other with the new BRICS country expansions, which are already frightening India and not very pleasing to Brazil, since the BRICS Islamization factor is growing, the mogul-mogul of various options for the convergence of resources is being launched. and forms of their use, imbalances in the development of each state and the chaos of the BRICS and the weakness of its ideological platform are only being formed.

The document, which summed up the results of the decisions reached by the BRICS forum, held under the motto “BRICS and Africa: a partnership for accelerated joint growth, sustainable development and inclusive multilateralism, consists of 94 final points, has very significant parts that form the concepts of further vectors for the emerging agenda of future meetings and search for common solutions in the world of politics, finance, ICT and society. The very titles of the sections of this declaration are spelled out as “partnership for inclusive multilateralism”, “shaping an atmosphere of peace and development”, “partnership for accelerated growth”, “partnership for sustainable development”, “deepening humanitarian exchanges” and “institutional development” define the whole set of approaches to the framework of a multipolar world, which should grow from ways to solve specific problems, overcome problems and build synergistic effects of common interests, as, for example, is prescribed in relation to joint space activities in paragraph 69: from congratulating common space agencies on the successful implementation of the Agreement on the creation of a satellite constellation for remote

sensing of the Earth (ERS) of the BRICS countries through the exchange of data samples received by this ground-based satellite system and held two events of a special profile: the 1st Forum on the use of the BRICS satellite constellation in November 2022, organizing a general meeting meetings of the BRICS Joint Council on Space Cooperation (especially at the time of the lunar triumph of India, which so brilliantly landed its probe on the moon during the summit itself), as well as building up satellite communications and communications systems in the form of start-ups and pilot projects. The very idea of exchange between the BRICS member countries in the field of extraction and distribution of remote sensing data should “provide information support for the economic and social development of the BRICS countries [1;4]. And this whole space epic of “brick integration” is taking place against the background of the growth of innovation exchange and technological cooperation through the BRICS Technology Transfer Network itself and iBRICS (Specialized Innovation Network of BRICS), bringing the issues of convergence of globalized industries of the countries of the integration group into a single format of cooperation within the framework of the Working Group BRICS Partnership in Science, Technology and Innovative Entrepreneurship, with growing support from the BRICS Learning and Incubation Network, the BRICS Technology Transfer Training Program and the Brick Science Unity Approved Startup Forum [1;5]. These actions help the Chinese business to have its advantages in the ongoing dicoupling with the United States and lead to the imposition of their technological, schematic / chip and packaging solutions for “high-tech” gadgets to all countries of the emerging world of equal opportunities, the “big five against the global seven”.

All this is happening against the background of recognition of the key role of the New Development Bank (NDB) under the leadership of its President Dilma Rousseff (paragraph 46), which, in addition to space and innovation for all BRICS members, actively pledges to support three new members of this bank, namely the UAE, Egypt and Bangladesh, ready to adjust “their operational policies in accordance with their governance mechanism, taking into account national development priorities and goals”, other members and participants of the NDB programs in financing MSMEs (micro, small, medium enterprises) (paragraph 37), as a key and the driving force behind the BRICS economies, PPPs (para. 49), the Green Agenda and the work of the BRICS Roadmap on “Practical Cooperation on ICT Security and the BRICS Working Group on Security in the security of ICT products and systems (paragraph 24), countering new pandemics and covid waves (paragraph 50) [1;6]. And this should over the next decade become a weighty alternative to Bretton Woods and its mechanisms, courts and areas of responsibility in trade and in delimiting the rules of global competition between countries of different levels of market orientation.

Particularly important in the Declaration is paragraph 36, where the BRICS states are ready to “contribute to the activation of the BRICS Partnership for the New Industrial Revolution (PartNIR) and the creation of new opportunities for new industrial development”, “on the establishment of an Industrial Competence Center in cooperation with UNIDO to jointly support the development of Industry 4.0 skills .” [1;7]. And here India and China can become the main horizons of the upcoming robot-humanoid way of life, given the flight of the United States from China and the involvement of Southeast Asia and its future “tigers” in the processes of new industrialization and the growing polarization of “high-tech” in their structures like KUAD or AUKUS.

I am glad that those wishing to enter the BRICS are observed today, according to S.V. Lavrov, the queue is about 60 states long, and since January 1, 2024, new members admitted, such states as the UAE, Saudi Arabia, Iran, Argentina, Egypt and Ethiopia, have looped the scheme for the export and import of hydrocarbons, for the first time in the history of the world, concluding into a single integration field of the largest resource suppliers and their consumers, thereby improving the work of OPEC itself, and making the oil and gas sales market less volatile and more predictable [1;8].

The problems of this integration union of independent, friendly players who equally respect and hear each other should be included in the framework of the new Bretton Woods 2.0. and the Jamaica Conference, resolved through the alternative ideology of the new WTO 2.0. and as a result of a significant correction of the Group of 20, and even more so outside the influence of the Group of 7, due to the single currency in the financial institution of the NDB and the creation of a whole series of rating and consulting agencies, judging and trading arbitration platforms, new ecosystems and their own metauniverses (here China and India sets the tone for all BRICS members) for global trade and for uninterrupted technological exchange, to hedge a possible future growth of growing mutual grievances and claims, as we just saw in the statement of the Prime Minister of Kazakhstan on the 9th anniversary of the EAEU [1;9].

And for 15 years, it is Russia, in preparation for the autumn BRICS summit in Kazan (on the 16th), that should develop clear social elevators and the BRICS ideology, its ultimate goal and infrastructure priorities, a space unified program of tasks within the solar system and for the development of countries of “brick will” heights of deep space [1;10].

The thesis that “Africa solves all its problems only by African means” sounds beautiful and encouraging, but already now, (point 16) Niger can be lost to the rebellious people in search of anti-colonization justice, which can be suppressed by UNMRWS along with the French Legion and detachments “soldier of fortune”, which E. Prigozhin and his PMC “Wagner” so successfully and categorically op-

posed. It is his death and D. Utkin's death that can trigger the mechanisms of counterproductive decisions and weaken the advancement of Russia's interests, forcing its actors to the periphery of the continent. The consequences of this catastrophe will be shown to us in the near future by the anti-Russian Western coalition, not only in Africa, but also in the ADF, and then the scale of the tragedy of the death of the leadership of this PMC will hardly be overestimated. Therefore, "African problems in their African solution" are still experiencing a certain pause, and only our alliance with China's PMCs and the assistance of India and other countries of the African continent can allow us to maintain a certain status quo, although, alas, not in all countries of the region, as it was brilliantly demonstrated by E. Prigogine, earlier [11].

It is the ability to build a compromise for Russia's further maneuver both in the ADF and in the global economy through such platforms as the SCO and BRICS that make our positions unique and move us to leadership positions among all those who want their personal role in the world orchestra, and the solution of the global task food security for all BRICS participants with the help of Russia creates a unique chance for us to maneuver and rewrite new history according to the classical scheme of unity of the balance of interests and geographical zoning of monetary and military zones of the urban future, which, most likely, will be discussed at BRICS 16/2024 in Kazan next year.

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俄罗斯联邦医疗保健数字化转型水平分析
**ANALYSIS OF THE LEVEL OF DIGITAL TRANSFORMATION OF
HEALTHCARE IN THE RUSSIAN FEDERATION**

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注解。 研究目的是对医疗保健数字化进程的各个方面进行全面分析，得出医疗保健数字化转型领域战略方向在实现“数字化”方面的实施程度的结论。成熟度”，以及制定加速和实现更高水平的医疗保健数字化的建议以及支持它的制度措施。

研究的方法论基础依赖于系统分析的方法。

研究成果。 这篇科学文章致力于研究俄罗斯联邦经济可持续平衡发展的一个重要指标——国内医疗保健的数字化转型水平。 在研究中，作者阐明了国内医疗保健数字化转型的核心思想。 作者从民众医疗服务的可及性和医疗保健本身的经济效益，以及提高数字素养和确保医疗保健信息安全的角度分析了医疗保健数字化的方向。 作者确定了表征国内医疗保健数字化转型水平现状的趋势。 作者提出了加快医疗保健行业数字化并实现更高水平的制度条件，以实现国内经济的可持续发展。

关键词：数字化转型、医疗保健、数字化、战略方向、数字成熟度。

Annotation. *The purpose of the study is to provide a comprehensive analysis of various aspects of the process of digitalisation of healthcare, allowing conclusions to be drawn about the degree of implementation of the strategic direction in the field of digital transformation of healthcare in terms of achieving “digital maturity”, as well as the development of proposals to accelerate and achieve a higher level of digitalisation in healthcare and institutional measures to support it.*

The methodological basis of the study relies on the methods of system analysis.

Research results. The scientific article is devoted to the study of a significant indicator of sustainable balanced development of the economy of the Russian

Federation - the level of digital transformation of domestic healthcare. In the study, the authors clarified the key idea of digital transformation of domestic healthcare. The authors analyse the directions of digitalisation of healthcare both from the point of view of accessibility of medical services for the population and economic efficiency of healthcare itself, as well as increasing digital literacy and ensuring information security in healthcare. The authors have identified trends that characterise the current state of the level of digital transformation of domestic healthcare. The authors propose institutional conditions to accelerate and achieve a higher level of digitalisation in the healthcare sector for the purpose of sustainable balanced development of the domestic economy.

Keywords: digital transformation, healthcare, digitalisation, strategic direction, digital maturity.

Like many other spheres of life of a modern person, the healthcare sector is subject to digital transformation, which implies the dynamic development of tele-medicine, the use of complex systems of automation of organisations, electronic document management, as well as mobile applications that imply simplification of the procedure of access to medical services for citizens of the country [5, p. 38].

The strategic direction in the field of digital transformation of healthcare is approved by the order of the Government of the Russian Federation No. 3980-r dated 29 December 2021. It defines the transformation goals as:

- high level of “digital maturity”;
- optimisation of medical staff work time through the automation of processes that allow for optimal patient routing;
- Improving the quality of interdepartmental interaction;
- achieving completeness and reliability of information on the state of health of patients, which makes it possible to detect diseases in as many patients as possible as early as possible.

The key idea behind the digital transformation of healthcare is the transition to a better level of interaction between patients and medical staff through the cost-effective and safe use of information and communication technologies. However, achieving the goal is possible with a detailed elaboration of state policy, ensuring a balanced control and supervision, planning of resources in the healthcare sector, and, importantly, timely training and retraining of highly qualified personnel with digital competences, as well as the coordinated work of all participants in this process of restructuring.

The aim of the study is to provide a comprehensive analysis of various aspects of the digitalisation of healthcare, allowing conclusions to be drawn about the extent to which the strategic direction in the area of digital transformation of healthcare has been implemented in terms of achieving “digital maturity”, as well

as to develop proposals to accelerate and achieve a higher level of digitalisation in healthcare and institutional measures to support it.

The study is based on the analysis of the information base published by Rosstat in the statistical collection “Digital Economy”, as well as provided by the Ministry of Health of the Russian Federation “On the results of the work of the Ministry of Health of the Russian Federation in 2022 and tasks for 2023” [1], as well as analysing open sources of information on the digital transformation of modern domestic healthcare.

The study is based on a systematic approach, taking into account the analysis of the areas of digitalisation of healthcare both in terms of accessibility of medical services for the population and the economic efficiency of healthcare itself, as well as increasing digital literacy and ensuring information security in healthcare.

The following can be attributed to the tasks of digital transformation of the healthcare sector:

- development and implementation of an effective state policy in the healthcare sector, including on the basis of analysing big data on the state of health of the country’s citizens;
- early qualitative transition to electronic document management in the Russian Federation’s healthcare system in compliance with the principle of information protection, including personal data and medical confidentiality;
- formation of electronic databases on the treatment of diseases based on the processing of primary medical documents using cloud technologies;
- ensuring continuity of medical services: from prevention to the results of diagnosis, treatment and rehabilitation after a disease;
- reducing the time spent by medical staff not related to the provision of medical care to the patient;
- and, finally, ensuring competent management of healthcare resources at the federal and regional levels.

Thus, digital technologies in the transition to a human-centred health care system can make health services transparent, accessible and of higher quality, expand the scope of medical care, thus strengthening the national health care system.

An important aspect in the process of digital transformation is a unified information space based on the repeated use of once-entered data in all cases: at the time of providing medical care to patients, when they make payment procedures, when surveying patients to assess the effectiveness of medical services provided to them [1].

The formation of a unified information space is possible under the condition of mutual integration of all digital resources of the national healthcare system, both federal and regional, as well as of the MHI system on the basis of application of

all key services, including the master register of patients, digital twin of a medical organisation, digital twin of a medical worker, digital profile of a patient, digital twin of a process.

An indispensable component of the process of digital transformation of domestic healthcare is to ensure the compatibility of data collected for analysis. A common information space is possible with the use of universal normative and reference information in all information systems in use.

In 2022, as a result of the project “Creation of a unified digital circuit in healthcare based on the unified state information system of healthcare (UGISH)”, the following results were achieved:

- 1.019 million (5.6% more than planned for 2022) automated workplaces of medical personnel are connected to medical services in the constituent entities of the Russian Federation;
- 100% of designated structural subdivisions of medical organisations of state and municipal healthcare systems in the constituent entities of the Russian Federation are connected to a secure data transfer network and use medical services to provide medical care to patients, interacting with the UGISH;
- 88.4% (28 p.p. more than the plan for 2022) of medical care cases were provided with electronic documents in the UGISH systems;
- 76.6% (19 p.p. more than the target for 2022) of medical organisations provide patients with access to medical documents via the Patient Personal Account on the portal of state services;
- 56.5% (27 p.p. more than planned for 2022) of citizens have access to electronic medical documents in the patient’s personal cabinet on the state services portal after medical care has been rendered;
- 32.79 million citizens (36.6% more than planned for 2022) used the services in the patient’s personal cabinet on the state services portal;
- 62.7% (15 p.p. more than the plan for 2022) of appointments with doctors were made remotely by patients;
- As of January 01, 2023, 500,000 medical staff (97%) of medical organisations were equipped with enhanced qualified electronic signatures obtained free of charge.

To make the transition of the healthcare system to electronic document management possible, the Russian Ministry of Health is developing structured electronic medical documents (SEMDs). Since 2019, 75 types of SEMDs have been developed, providing 80% of the needs of medical organisations for the organisation of electronic document management. In 2022, another 16 new types of SEMDs will be developed, and more than 350 million documents will be registered in the UGISH subsystem.

In 2022, 21 million doctor appointments, 4.8 million vaccination appointments, 1.5 million house calls, and 64.1 million citizens were informed about rehabilitation opportunities through the Unified State Services Portal.

More than 243,000 applications for routine accreditation were made through the federal register of medical organisations and the federal register of medical workers, more than 536,000 extracts were sent to the portal, and more than 8,000 applications for registration of organisations in the register of medical organisations were submitted through the Unified Portal of State Services.

An important aspect of e-health work is to ensure information security in the sphere of domestic healthcare. Thus, in autumn 2022, the Ministry of Health of the Russian Federation created the Industry Centre for Information Security and Import Substitution to improve the reliability of electronic medical services.

Every year, information protection measures are developed that take into account the peculiarities of the operation of medical devices connected to the Internet. They also include the procedure for updating software on foreign medical equipment.

The data published by Rosstat in February 2023 shows an increase in spending on the digitalisation of domestic healthcare. In 2021, healthcare organisations spent 2.6% of the total costs of all types of economic activity on the creation, distribution and use of digital technologies, as well as related products and services, up 0.4 p.p. from the 2020 figure.

The costs of healthcare organisations in the Russian Federation on digitalisation have shown positive dynamics over the past few years: in 2019, the indicator was 1.6% of the total, in 2020 - 2.2%, in 2021 - already 2.6%. However, these figures are not comparable in volume to an area such as “Information and Communication”. Annual expenditure on digitalisation in this area reaches almost 30%.

The contribution of ICT to Russia’s economic development in the healthcare sector as a percentage of GDP in 2020-2021 was kept at 3.4%. The maximum contribution to economic development is still recorded according to Rosstat data in the sphere of trade (13%).

According to Rosstat, 81.5% of all healthcare organisations had access to broadband internet in 2021. Over the year, this indicator decreased insignificantly, by only 1 p.p. The use of high-speed internet with speeds above 100 Mbit/s has become more widespread, with about 8% of healthcare organisations having access to it.

Having analysed the structure of digital technologies used in healthcare and social services organisations, we can say that one third of healthcare organisations used cloud services, the Internet of Things was used by 15.1% of healthcare organisations in 2021, and industrial robots accounted for only 1.6%.

The dynamics shows an increase in the values of six types of digital technologies from those presented by Rosstat in the field of healthcare and social services. This is particularly noticeable in the area of technology for collecting, processing and analysing big data (the growth of the indicator for the year was 3.4 p.p. from 27.2% in 2020 to 30.6% as of 2021). Two types of digital technologies showed a drop: digital platforms, down 1.8 p.p.; geographic information systems, down 1.5 p.p.

The most demanded software tools in the healthcare sector in 2021 were electronic document management systems and financial settlements in electronic form. There is a growth of all indicators in dynamics.

The leading means of information protection in healthcare organisations are digital electronic signatures, 80% of healthcare organisations use them. Significant reduction is observed only in the use of such information protection means as spam filter. Over the year, the indicator decreased by 16.6 p.p. from 40.3% in 2020 to 23.7% in 2021, showing the lowest frequency of use.

According to the NAFI analytical centre, 80% of Russians are willing to use telemedicine services, and 17% have already used telemedicine services. 82% of users believe that electronic services simplify interaction with government agencies and make it easier to obtain the required services. Almost half of Russians (48%) are convinced that the COVID-19 pandemic has had a positive impact on the development of online technologies in the country and in the medical sphere in particular.

Thus, along with some successes accompanying the healthcare sector on the path of its digitalisation, quite weighty issues concerning various aspects of transformation remain unresolved:

- duplication of information in electronic and paper format in medical organisations due to the lack of legal authority to switch to electronic medical documents only;
- lack of consensus between the Ministry of Health of the Russian Federation and the medical community regarding the final architecture of UGISH in terms of forming a unified system or connecting individual branches into a common main system;
- lack of well-established business processes in the healthcare system;
- the need to improve the level of digital literacy of current employees of medical organisations due to frequent errors of medical personnel when working with medical information systems and lack of attention to the system of prevention of these errors [2].

Thus, on the one hand, digitalisation provides the basis for a paradigm shift in healthcare delivery, creating the prerequisites for a transition from a reactive healthcare model to a proactive and personalised one, which is a serious chal-

lenge for the system. On the other hand, the emergence of the best practices of digital health requires very rapid translation on the scale of a particular region and the whole country, which requires completely different approaches to the management of these processes, including material support, and, most importantly, a different system of training for health care [6]. The solutions to these issues will allow us to fully realise the opportunities that modern digital technologies already offer in the field of domestic health care.

The use of information and communication technologies in the field of health care provides an opportunity to transition to fundamentally new approaches to the provision of medical care to the population of the country. After all, digitalisation facilitates not only the maintenance of electronic medical records, but also makes it possible to strengthen remote monitoring of a patient's health condition, to form a unified ecosystem of medical devices based on the Internet of Things technologies, and to ensure robotisation of medical services. The introduction of ICT is designed to improve the accessibility and quality of medical care. The collected data can be used for further analysis and preparation of medical recommendations on disease prevention and treatment. Medical staff can use the medical decision support system to minimise medical errors and quickly resolve routine tasks, thus focusing the attention of doctors on cases that require personal involvement and control.

However, the process of digitalisation of domestic healthcare should be accompanied by the institutional transformation of the industry with the involvement of responsible and interested parties to accelerate the procedure for the introduction of modern technologies in medical institutions [4; 7]. It is necessary to work out the issues of ensuring the legitimacy of electronic medical documents with the help of electronic signature; building an effectively functioning Unified State Information System in the field of health care on the basis of a modular approach to architecture development; increasing the level of digital literacy of specialists in medical organisations in order to reduce their fatigue and maintain a high level of efficiency of their work [8]. Special attention should be paid to the improvement of information systems in order to reduce the burden on medical staff in terms of related services provided in support of basic medical care. For example, it is suggested to consider the option of voice input of information into medical information systems [3]. Or the support of medical systems to check the compatibility of medicines prescribed by different medical specialists.

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提高俄罗斯知识密集型产品在国际出口市场竞争力的现代方法
**MODERN APPROACH TO IMPROVING THE COMPETITIVENESS
OF RUSSIAN KNOWLEDGE-INTENSIVE PRODUCTS IN THE
INTERNATIONAL EXPORT MARKET**

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抽象的。作者描述了一种开发高科技产品出口决策支持系统的新方法。揭示了中观经济系统行为的动态：国际出口市场上高科技产品的工业制造商。主要的出口问题已经确定。针对所发现的问题，提出了一种基于产品数字孪生的出口情况建模现代方法。作者结合大多数国家对俄经济和出口政策的变化，指出了2022年后出现的新经济形势的具体情况。决策支持系统(DSS)开发的新方法是根据经济系统动态行为的结果进行技术经济分析的初级数据处理和技术经济分析的二次数据修正。

关键词：数字双体、建模、技术经济分析、综合后勤保障、决策支持系统、系统分析。

Abstract. *The author describes a new approach to the development of a decision support system for the export of high-tech products. The dynamics of the behavior of meso-level economic systems: an industry manufacturer of a high-tech product on the international export market is revealed. The main export problem has been identified. Regarding the identified problem, a modern approach to modeling the export situation based on the digital twin of the product is proposed. The author points out the specifics of the new economic circumstances that arose after 2022 in connection with the change in the economic and export policies of most countries in relation to Russia. A new approach to the development of a decision support system (DSS) consists in conducting primary data processing of technical and economic analysis and secondary data correction of technical and economic analysis based on the results of the dynamic behavior of economic systems.*

Keywords: *digital double, modeling, technical and economic analysis, integrated logistics support, decision support system, system analysis.*

The relevance of the research lies in the need to increase the competitiveness of unique high-tech products in the international export market. The main problem is the fact that a foreign customer wants to know: how much will have to pay for integrated logistics support for technical operation in order to timely and efficiently maintain the operability of the product while maintaining a given level of technical readiness. To solve this problem, it is necessary to apply a new approach to the development of a decision support system based on a digital twin. The uniqueness of the digital double of the product corresponds to the technical characteristics of the real-world product [7-9]. The more precisely the digital double is created, the more accurate the simulation results on it. The Russian manufacturer of high-tech products is interested in ensuring quality assurance of maintenance of the exported product in a foreign country. The cost of post-production maintenance.

A new approach to the development of a decision support system (DSS) consists in conducting primary data processing of technical and economic analysis and secondary data correction of technical and economic analysis, taking into account the dynamic behavior of economic systems. The economic systems are: an industrial enterprise and an international export market (meso-level). The primary processing of technical and economic analysis data reveals the dependence of technical characteristics, economic indicators and the resulting cost of integrated logistics support for technical operation. Secondary data processing (correction) takes into account the dynamics of the behavior of meso-level economic systems in real time. With the change in the requirements of the Rules of International Trade Incoterms 2023 (terms of delivery), it is necessary to adjust the time intervals for transporting the product to a foreign country. All changes are interrelated. Changing the numerical values of the time interval.

The provisions of the foreign trade contract on the terms of invoicing are being strengthened (detailed), the % of penalties for late delivery of products to a foreign customer are increasing, the requirements for the quality of the roadway across the entire transport infrastructure are increasing, etc. Direct access of industry enterprises to the international export market is fraught with difficulties of sanctions restrictions. The author has developed an approach of logical ordering of input variable basic and auxiliary parameters applicable to the case of export of high-tech products to a foreign country.

DSS for the export of high-tech products based on the digital twin of the product is an additional tool for technical and economic analysis of the dynamic state of economic systems. The export features are taken into account: the choice of a foreign country can be changed in any order; monetary units can be conditional; the cost of transporting the product is carried out by separate costs and is prescribed in the provisions of the foreign trade contract, with the distribution of legal responsibility between the domestic manufacturer and the foreign customer [10].

The concept of the “digital twin” is part of the fourth industrial revolution and is designed to help enterprises solve problems, one of which is the accuracy of forecasting. Those industry enterprises that plan high-tech products for export face the problems of forecasting the cost of integrated logistics support for the technical operation of the product for a long period of after-sales service. In order to ensure the accuracy of forecasting, a digital twin of the product and a decision support system are being developed. The digital double of a product (CDI) is a digital model of a real-life prototype of a product. It displays the composition of the product, the functional and logistical relationships of the components of the product (SDI).

The CDI contains real data on the technical characteristics of the product, the cost of the MDI, types of maintenance (maintenance), the average time to failure of each MDI, time characteristics: average repair time, recovery time of the MDI and the product as a whole, and other technical characteristics, operational and economic indicators, the planned profit margin. The digital twin of the product is designed for simulation modeling in the decision support system [11-13]. General approaches to the implementation of ILP technology for mechanical engineering products were presented in the book by a team of authors [5]. Approaches to the implementation of ILP in the aircraft industry are presented in [1], in the shipbuilding industry [4]. An integrated approach in the research of modern management technologies is indicated in [2]. The socio-economic significance of the ILP of transport infrastructure is presented in the study [3]. The assessment of the events taking place in terms of standardization of ILP processes is presented by domestic scientists [14]. The electronic tool identification system for the engine industry is presented in [15]. The analysis of foreign ILP standards of the USA and the UK is presented in the journal [16]. “Cataloging and Information Technology Center” (KATALIT) in the main area of activity, conducts research on state defense orders, the part of which is the introduction of information support for the operation and repair of products based on CALS technologies [6].

The given review of the publications of Russian scientists indicates the relevance of the problems of the use of ILP technologies in various industries. Industry manufacturers, as a rule, have serial products (aircraft, ships, engines, ground vehicles, etc.), where a smaller share of production is expected to be exported. The unique high-tech radar products are designed in single copies and have an ILP technology that differs significantly from the ILP technology of serial products of non-export value.

In particular, a distinctive feature of export high-tech products is a long after-sales period of maintenance, namely: warranty, post-warranty servicing and repair. In contrast to the approaches of industry organizations for the introduction of ILP technology for serial products, the author uses in-depth detailing up to the

level of characteristics of the components of the product. An integral part of the complex of measures for export ILP is the development and practical testing of the DSS, which helps the two interested countries to find acceptable technical characteristics, economic indicators and the resulting total cost of integrated logistics support for technical operation.

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调查破坏或损坏文化遗产（历史和文化古迹）的具体问题（俄罗斯联邦刑法第 243 条）

**SPECIFIC QUESTIONS OF INVESTIGATION OF DESTRUCTION
OR DAMAGE OF OBJECTS OF CULTURAL HERITAGE
(HISTORICAL AND CULTURAL MONUMENTS) (ART. 243 OF THE
CRIMINAL CODE OF THE RUSSIAN FEDERATION)**

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Destruction of an object of cultural heritage of the peoples of the Russian Federation (Article 243 of the Criminal Code of the Russian Federation) is such harm to it when it becomes completely unusable, ceases to meet its cultural and intended purpose (i.e. the object, in its idea, ceases to exist). And damage to such an object is such a change (damage, breakdown) of this object, as a result of which it loses its qualities to such an extent that it temporarily or fragmentarily turns out to be unsuitable for its intended use and only after labor costs (restoration) acquires its former value.

As of March 29, 2023, the Unified State Register of Cultural Heritage Objects (monuments of history and culture) of the peoples of Russia included 151,187 objects¹. It should be noted that in Russia the first state registration of “all monumental and clothing monuments of art and antiquity” and their registration were carried out on the basis of the Decree of the Council of People’s Commissars of the RSFSR of October 5, 1918 “On the registration, registration and protection of monuments of art and antiquity, owned by individuals, societies and institutions².”

In part 3 of Art. 44 of the Constitution of the Russian Federation it is written that “everyone is obliged to take care of the preservation of historical and cultural heritage, to protect historical and cultural monuments.” Meanwhile, the destruction or damage of objects of cultural heritage has long been considered the so-

¹ See: Unified State Register of Cultural Heritage Objects (Historical and Cultural Monuments) of the Peoples of the Russian Federation // Open Data Portal of the Ministry of Culture of the Russian Federation. URL: <https://opendata.mkrf.ru/opendata/7705851331-egrkn> (date of access: 04/14/2023).

² See: Collection of Legalizations and Orders of the Workers’ and Peasants’ Government. 1918. No. 73. First department. Art. 794.

called crimes without victims, and some bodies of the Ministry of Internal Affairs of Russia, which, in accordance with Art. 151 of the Code of Criminal Procedure of the Russian Federation entrusted with the production of a preliminary investigation on the specified type of crimes, they were treated with greater condescension. In particular, this can be observed according to judicial statistics. According to them, everything was convicted under Art. 243 of the Criminal Code of the Russian Federation in: 2009 - 0, 2010 - 0, 2011 - 0, 2012 - 4, 2013 - 0, 2014 - 0, 2015 - 0, 2016 - 6, 2017 - 0, 2018 - 0, 2019 - 4, 2020 - 7³.

Compared to, for example, drug trafficking, arms or ammunition trafficking, illegal migration organization, they do not cause the same level of damage, but still directly harm society and the state. Monuments of history and culture, being the property of the people, testify to its contribution to the development of world civilization, influence the development of scientific knowledge, education and culture, the formation of patriotism, moral and aesthetic education. As a limited resource, cultural property provides a close link to a country's culture and identity; and their loss is irreparable, their destruction deprives a nation of its heritage.

The foreign and domestic history of the commission and investigation of the type of crimes under consideration is rich, vibrant and accessible for discussion. Recall at least the following six well-known acts, which at one time caused a very wide public outcry. 1) a resident of the ancient Greek city of Ephesus, Herostratus, burned the temple of Artemis in this city in 356 BC; 2) a native of the Moscow province, Abram Abramovich Balashov, with a knife inflicted three long cuts on the faces of Tsar Ivan IV and his son of Repin's painting "Ivan the Terrible and his son Ivan on November 16, 1581" in the Tretyakov Gallery in Moscow on January 29 (or January 16, according to the old style) 1913; 3) Hugo Vallegas, a citizen of Bolivia, threw a stone at the painting "Gioconda" by Leonardo da Vinci, located in the Louvre Museum in 1956, damaging the canvas at the right elbow of the "Mona Lisa"; 4) a resident of Australia, Laszlo Tot, damaged the sculpture of Michelangelo Buonarrotti "Pieta" ("Lamentation of Christ") in St. Peter's Basilica in the Vatican in 1972 with a rock hammer; 5) a resident of the Lithuanian SSR, Bronius Maigis, threw a bottle of sulfuric acid on the painting "Danae" by the artist Rembrandt, located in the "Hermitage" Museum in Leningrad in 1985; 6) a native (refugee) from Rwanda named Emmanuel set fire to the large Gothic Cathedral of Saints Peter and Paul in Nantes (France) in 2020. During the Great Patriotic War, the Extraordinary State Commission for the Establishment and Investigation of the Atrocities of the Nazi Invaders in the Liberated from the Occupiers districts of the country, including investigating the destruction of national, historical monu-

³ See: Judicial Department of the Supreme Court of the Russian Federation. Summary statistical information on the state of criminal record in Russia from 2009 to 2020 // URL: <http://www.cdep.ru/?id=79> (date of access: 11.02.2023).

ments and cultural values of the Soviet state. The criminal destruction of monuments of world culture - the museum-estate of L.N. Tolstoy in Yasnaya Polyana, P.I. Tchaikovsky in Klin, A.P. Chekhov in Taganrog, an old Russian monastery called Novoyeruslimsky, founded in 1656 and restored by architects B.F. Rastrelli and M.F. Kazakov, and other monuments⁴.

Nowadays, deliberate destruction or damage to an object of cultural heritage of the peoples of Russia often occurs as a result of non-fulfillment or violation of the requirements for the performance of work on the overhaul of common property in an apartment building, which is a cultural heritage site included in the register. Such criminal acts are detected as a result of state control (supervision) in the field of protection of cultural heritage objects; when facts are discovered that indicate damage to the object of cultural heritage in the course of these works.

Black diggers are often guilty of destroying or damaging an object of the cultural heritage of the peoples of Russia - one or another archaeological monument. In their criminal activities, they do not consider archaeological sites as historical sources for the knowledge of the past people, but they look at things in themselves, without any connection with the structure of the society to which they belong. Archaeological monuments, as integral aggregates, as inseparable from the historical social environment, are not included in the field of their interests. They extract monuments in dismembered form, i.e. from the whole monument, the most valuable, in their opinion, individual parts are extracted, and each such part is often realized separately, in isolation from the others. Their ultimate goal is profit. Therefore, the very methods of black diggers are elementarily simple and crude: they dig without any system, without any rules, destroying monuments, extracting the most valuable, and abandoning the least valuable.

Deliberate destruction or damage to the cultural heritage of the peoples of Russia is often committed in conjunction with other crimes. Difficulties arise in qualifying such acts.

Often, the deliberate destruction of an object of cultural heritage of the peoples of Russia takes place when it is stolen. Theft, associated with deliberate destruction or damage, if the latter contains signs of a criminally punishable act, must be qualified according to the totality of crimes as theft of another's property and under Art. 243 of the Criminal Code of the Russian Federation. Even if a part of the specified object is stolen and the remaining ones are damaged, then in these cases the actions of the perpetrator should be qualified collectively as theft and damage to this object, provided that the damage is so significant that it constitutes a crime under Art. 243 of the Criminal Code of the Russian Federation.

⁴ See: Lapin E.S. History of the investigation of crimes in Russia: 1939 – 1949: monograph / E. S. Lapin. 2nd ed., revised. and additional Saratov: Type. "TechnoDecor", 2012. P. 345.

Deliberate destruction or damage to the cultural heritage of the peoples of Russia sometimes acts as a way to encroach on the life and health of an individual. S., out of revenge, doused with a flammable liquid specially brought with him and set fire to the boards and debris at the door and dead wood at the windows of the church of the 18th century, which was put up for restoration; guard K., who was in the church, escaped, but received mild burns, attributed by the investigation to the minor severity of harm to health from the fire of the burnt door of the religious building.

When the intent to cause death to a person is established, then the act must be qualified according to the totality of the crime, as the destruction or damage to historical and cultural monuments (Article 243 of the Criminal Code of the Russian Federation) and an encroachment on life, depending on the consequences. If the destruction or damage to these objects was accompanied by harm to health, then here too the corpus delicti under Art. 243 of the Criminal Code of the Russian Federation, and the corresponding offense of causing harm to health of one degree or another.

Destruction or damage to these objects is often associated with hooliganism, since “gross violation of public order, expressed in clear disrespect for society” (Article 213 of the Criminal Code of the Russian Federation) can manifest itself in the form of deliberate destruction or damage to objects listed in Art. 243 of the Criminal Code of the Russian Federation. The correct qualification in such cases is as follows: the destruction or damage of an object of the cultural heritage of the peoples of Russia forms an independent composition - a legal assessment must be given to each crime separately, and everything that has been done must be qualified according to the totality of Art. 213 and Art. 243 of the Criminal Code of the Russian Federation.

Finally, damage or destruction of these objects may be associated with vandalism (Article 214 of the Criminal Code of the Russian Federation) (for example, applying graffiti to the surface of cultural heritage monuments is not an art, but a way of damaging these monuments), desecration of the bodies of the dead and their burial places (244 of the Criminal Code of the Russian Federation) and incitement of hatred or enmity, as well as humiliation of human dignity (Article 282 of the Criminal Code of the Russian Federation); then the deed is qualified according to the totality of crimes provided for in accordance with the indicated articles of the criminal law (clause 11 of the Resolution of the Plenum of the Supreme Court of the Russian Federation of June 28, 2011 No. 11 (as amended of October 28, 2021 No. 32)).

Let us briefly consider individual issues related to the production of individual investigative actions in the investigation of crimes under Art. 243 of the Criminal Code of the Russian Federation.

A study of forensic practice in this category of cases shows that, according to forensic experts, the defendants needed psychiatric help.

Stationary forensic psychiatric examination, which is carried out exclusively in state forensic organizations, it raises the question: did the suspect (accused) suffer from any chronic mental disorder, dementia or other morbid state of mind that deprived him of the ability to realize the actual nature and social danger his actions and direct them during the period relating to the preparation and commission of the act imputed to him? ⁵

Another frequently appointed forensic examination in cases of destruction or damage to historical and cultural monuments is a commission cultural forensic examination. The task of such an examination is to confirm or refute the existence of a fact in relation to cultural heritage objects using methods specially developed for this, the decision of which, drawn up as an expert opinion, is then used as evidence during the preliminary investigation and trial. The main task of the said examination, appointed for the type of crimes under consideration, is to determine the cultural and historical value of the objects under study: objects of art, antiquities, objects of immovable heritage, etc. Approximate questions that can be put to the experts are as follows: is the given object of cultural value; whether this object is a monument of cultural history. In this regard, the following should be noted. In the structure of executive authorities (Government) in the constituent entities of the Russian Federation, there is certainly a subdivision (committee) for cultural heritage. With such a unit, the investigator must certainly establish close cooperation. From him, in particular, the investigator can obtain a certificate of belonging (non-belonging) of this destroyed or damaged real estate object located on the territory of the region (republic, territory) to cultural heritage objects (for example, the Committee for Cultural Heritage of the Saratov Region could provide a certificate, which stated that “this monument of cultural heritage of regional significance “Manor House” by A.K. Reinecke 1902 - 1903 is protected by the state ...”). Through this Committee, it is possible to appoint experts for the production of a cultural forensic examination, that is, to decide who from the scientific community can be involved (appointed) as experts in a study relating to cultural heritage sites.

If considering the type of crime is associated with a crime of an extremist nature, then it may be necessary to appoint and conduct a forensic linguistic examination, which can be carried out in accordance with the Decree of the Government of the Russian Federation of November 16, 2021 No. 3214-r (as amended of March 22, 2023 No. 672 -p only experts of laboratories of state departments

⁵ See: Rossinskaya E.R. Forensic examination in civil, arbitration, administrative and criminal proceedings: monograph / E.R. Rossinskaya. 4th ed., revised. and additional M.: Norma: INFRA-M, 2023. P. 521.

- expert institutions of law enforcement agencies and special services, as well as in forensic expert institutions of the Ministry of Justice of Russia.

Other types of forensic examinations may be ordered, for example, chemical forensic examinations; it establishes if the crime is committed by arson, which is the liquid used to set fire to a given monument of cultural heritage; an expert chemist may, for example, conclude that the object submitted for examination is a mixture of turpentine and gasoline, which is a flammable liquid. The conclusion of the fire-technical examination establishes the source of the fire, the cause of the fire due to the initiating object of open fire introduced from the outside, as well as the likely use of flammable combustible liquids.

Inspection of the scene of the incident refers to the initial and urgent investigative actions in cases of this category. The tactics of its production depends on the method used by the subject of the crime to destroy or damage the object of the cultural heritage of the peoples of Russia. If there was such a fact as the presence of surveillance cameras installed near the specified object, then before inspecting the scene, it is advisable to familiarize yourself with the video recordings of these cameras in order to orient yourself in the circumstances of the incident. It is advisable to involve eyewitnesses of the incident, for example, the guards of this cultural heritage object, to participate in the inspection. For a qualified description in the protocol of inspection of the state of the monument, for example, works of art (icons, paintings, monumental paintings), it is necessary to provide for the participation of an artist-restorer. When fixing the scene of an incident, it is advisable to use color photography and video recording of the state of the monument in its direct and lateral illumination.

As practice shows, when investigating this category of cases, a person who has admitted his guilt in the deed agrees to participate in the verification of testimony on the spot in order to confirm that he initially gave consistent and truthful testimony, and, therefore, actively contributed to the disclosure and investigation of the crime (item “i” article 61 of the Criminal Code of the Russian Federation).

The scope of this article does not allow step by step to present to the slightest line all the issues related to the investigation of this category of crimes. We specifically focused only very generally on those issues that clearly convey the essential moments of the investigation of these criminal cases.

写作作为俄语课程中的一种言语活动
**WRITING AS A TYPE OF SPEECH ACTIVITY IN RUSSIAN
LANGUAGE LESSONS**

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抽象的。书面交流在现代世界中的作用非常重要。但人们应该区分书面活动和书面演讲。书面言语活动是用书面文字有目的、创造性地执行思想，书面言语是用书面语言符号形成和表述思想的方式。

俄语课程中仍然很少教授写作的富有成效的一面。学生的书面技能往往远远落后于其他类型言语活动的训练水平。

书面言语教学的目的是培养学生的书面交际能力，包括书面符号的掌握、书面言语作品的内容和形式。书面言语教学要解决的任务，关系到为掌握书面言语教学的内容创造条件。为了指定写作教学的任务，有必要考虑到该计划提供的技能：给外国记者写一封友好的信、写注释、摘要、在墙上的报纸上写注释、写信的能力 摘要，对所听和所读课文、文章的总结。

关键词：言语活动、写作、交际能力、书面演讲、练习、收件人。

Abstract. *The role of written communication in the modern world is extremely high. But one should distinguish between written activity and written speech. Written speech activity is a purposeful and creative execution of thought in a written word, and written speech is a way of forming and formulating thoughts in written language signs.*

It is the productive side of writing that is still little taught in Russian language classes. The written skills of students often lag far behind the level of training in other types of speech activity.

The purpose of teaching written speech is to develop students' written communicative competence, which includes the possession of written signs, the

content and form of a written work of speech. The tasks to be solved in teaching written speech are related to the creation of conditions for mastering the content of teaching written speech. To specify the tasks of teaching writing, it is necessary to take into account the skills that are provided for by the program: the ability to write a friendly letter to a foreign correspondent, write an annotation, abstract, note in a wall newspaper, write a summary, a summary of the listened and read text, essay.

Keywords: *speech activity, writing, communicative competence, written speech, exercises, addressee.*

Writing is “an additional means of communication to sound speech with the help of a system of graphic signs that make it possible to form speech to transmit it over a distance, to save its works in time” [2, p. 141].

Writing is closely related to other types of speech activity (“Speaking, writing, reading”). From the point of view of psychophysiology, writing is a complex process in which all analyzers function (visual, auditory, speech-motor, motor). This allows us to speak of writing as a “universal fixer” [4, p. 17-28].

Issues related to teaching students to take notes on educational literature have been the focus of attention of Russian language teachers for many years. The reason for the continued interest in note-taking is not difficult to understand. Note-taking of educational literature is one of the leading types of student learning activities throughout the entire period of study at the university.

Note-taking can be defined as a special type of analytical and synthetic processing of information, the purpose of which is to extract, systematize and generalize the most significant content of the source and fix it in writing in a form that eliminates the need to re-refer to it.

The synopsis is secondary in relation to the original source, it is an independent secondary text. Like any text, the synopsis has its specific features - content, semantic and structural integrity.

The thematic and semantic unity of the synopsis is expressed in the fact that all its elements are directly or indirectly related to the topic of the statement given by the original source and to the communicative setting of the writer (to fix individually important information with its possible subsequent restoration).

In the abstract, certain structural and semantic parts can be distinguished (in most cases even graphically designed), but the choice of such semantic parts, as well as their order, is arbitrary, it does not always coincide with what is in the original text. Connectivity is not a mandatory feature of the abstract, since the omitted connections exist in the memory of the writer, and can be restored when the information is “deployed”.

The mechanism of generating oral utterance cannot be transferred to learning to write. Skills in writing can be formed with the help of various exercises. To develop skills in writing, you can use the following exercises:

1. A written description of the picture on the topic or based on the topic;
2. Written presentation of the main content of the read text;
3. Writing an essay;
4. Drawing up abstracts or a plan for a message (report);
5. Writing a letter to a foreign peer, etc.;
6. Filling in the form at the hotel;
7. Writing a greeting card;
8. Compiling a note in a class or school wall newspaper.

Of the above exercises, the exercise aimed at teaching writing has communicative value. This is the easiest form of work. There is no single form of writing. The content of the letter depends on the writer himself. The language form of the letter can also be chosen by the author himself. The subject of the letter coincides with the subject of school textbooks. Correspondence is an important factor in the development of interest in the language. The teacher should explain the features of the letter:

1. date and place of writing the letter;
2. appeal;
3. writing personal pronouns;
4. the end of the letter;
5. writing the address on the envelope.

Written speech is characterized by formalization both in terms of language means and in terms of text structure. With the development of modern means of communication, this formalization has increased many times over. The ability to produce communicative messages in clear, generally accepted forms facilitates the correct perception and understanding of information outside the communication situation. Mastering the formal structure of different types of written texts (linguistic and content) in the target language is an important goal of teaching written communication. [5].

In modern intercultural communication, letters (documents) are written by hand in block letters or printed on the appropriate technology (PC, mobile phone, etc.).

The level of formation of communicative competence in written speech depends not only on the level of proficiency in a particular foreign language, but also on the general level of education of the writer, since the basis is the general ability to work with information.

Writing as a learning goal is provided for in the programs of schools of various types at all stages of education.

As the final requirements, the development of the ability to express one's thoughts in writing is put forward, i.e. use writing as a means of communication.

Upon completion of training at the initial stage (grades II-IV), elementary skills of independent solution of communicative and cognitive tasks in written speech should be formed.

On the material of sentences and simple texts, students should learn:

1. congratulate on holidays, birthday;
2. write your name, addressee's name, date and address correctly;
3. start and end a letter;
4. use printed text as a basis for drawing up a plan, questions, etc.;
5. describe simple drawings in the textbook.

The middle stage (grades V-VII) should provide a more intensive development of the ability to master writing in different situations of communication. The scope and scope of written statements are expanding, and the quality of texts is improving. The content of training at this stage should be more informative and based mainly on authentic material: samples of the epistolary type - texts of letters, post-cards, as well as articles from newspapers and magazines for teenagers in order to use them as models for developing the following skills:

1. inform a foreign friend about himself, his family, school, city, his interests and hobbies;
2. request information about the same from your addressee;
3. write a note or a letter to a newspaper or magazine, observing the norms adopted in the country of the language being studied;
4. provide basic personal information in the questionnaire or form;
5. make working notes after reading the printed text (draw up a plan, write out key words, speech formulas, etc.) for the purpose of their subsequent use in a written statement.

Education at the senior stage (grades VIII-IX) involves achieving a high level in the field of writing, which is expressed in improving the quality characteristics of the written text, expanding topics and problems of communication, and increasing the degree of students' independence.

The program of schools with an extended timetable provides for the development of sociocultural knowledge and concepts about the culture of written communication in the target language.

The main written works of students will be: a personal detailed letter to a friend; a letter to a newspaper or teen magazine, logically organized and well-formed; Questionnaires or forms for the purpose of requesting information and providing personal information.

When relying on a printed text or an oral message, students should learn how to take working notes, write a summary or essay. In addition, the following skills are formed:

1. communicate basic information to the addressee, expressing one's opinion or assessment of events, etc.;
2. to record in writing the main information or factual data from the text read or listened to;
3. draw up written plans or abstracts of oral statements;
4. logically state the essence of the topic or issue under discussion in writing.

Upon completion of training at the profile-oriented stage (grades X-XI), the level of development of communicative competence in the field of writing should ensure a more effective use of writing as a means of carrying out educational, professionally oriented and self-educational activities, which is expressed in a variety of involved situations of an official and informal nature, greater complexity of the produced texts, a high degree of independence and activity of students. The profile nature of this stage should be interpreted as further language learning in terms of communication, including intercultural communication, as a means of educational and professional activities in various fields of specialization.

The main written works of students will be: personal and official letter, message, essay, description, review, presentation, annotation, abstracts, project and term papers.

Students should be able to:

1. describe events, facts, phenomena;
2. report, request information of a detailed plan;
3. express their own judgment, opinion;
4. comment on events and facts, using argumentation and emotional-evaluative language means in the written text;
5. draw up a detailed plan or abstracts for oral presentation;
6. create secondary texts (abstracts, annotations);
7. fix factual information when perceiving oral or printed text;
8. make educational notes, i.e., compose a letter "to yourself" in order to organize your own speech activity [2].

At all stages of training, strategic skills are developed, the main of which include the following:

1. use the sample text as an information and language support;
2. check what is written with the sample;
3. refer to reference literature and dictionaries;
4. use paraphrase;
5. simplify written text;
6. use words - descriptions of general concepts;

7. resort to synonymous substitutions;
8. connect your experience with the experience of a communication partner [1, p. 250-252].

Learning to write is inextricably linked with learning other types of speech activity. With speaking and reading. Written speech allows you to save linguistic and factual knowledge, serves as a reliable tool for thinking, stimulates speaking, listening and reading in a foreign language.

We believe that only properly organized copying, students' knowledge of certain rules, patterns in the spelling of words in the target language, the habit of establishing associative links in the spelling of words, the performance of visual dictations can create the necessary conditions for mastering spelling and, therefore, for updating one of the components of the content. teaching writing as a means of fixing sounding speech.

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专家评估运动训练训练阶段乒乓球运动员准备状态指标的重要性
**EXPERT ASSESSMENT OF THE IMPORTANCE OF INDICATORS
OF READINESS OF PLAYERS IN TABLE TENNIS AT THE
TRAINING STAGE OF SPORTS TRAINING**

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抽象的。 尽管迄今为止有大量可用数据,但选择最有前途的孩子的问题仍处于不断改进和寻求新发展的阶段。 在现代运动员从初级训练到最高运动技能的训练体系中,预测未来成绩的阶段似乎很特殊[2, P.335-338]。

基于乒乓球运动员成功标准规范来预测竞技活动有效性的主题研究很少,有必要进行研究并确定在制定标准时运动员发展中最重要的重要组成部分。 运动训练的
训练阶段。

关键词: 乒乓球运动员选拔标准、训练阶段、信息指标、功能素质、一般身体素质、专项技术准备、技战术准备、心理准备。

Abstract. *The problem of selecting the most promising children is in the stage of constant improvement and search for new developments, despite the numerous available data to date. In the modern system of training athletes from players of initial training to the highest sports skill, the stage of forecasting their results in the future seems to be special [2, P. 335-338].*

The topic of predicting the effectiveness of competitive activity based on the specification of criteria for the success of players in table tennis is poorly studied, it is necessary to conduct research and determine what is the most important component in the development of athletes when developing criteria at the training stage of sports training.

Keywords: *criteria for the selection of table tennis players, training stage, informative indicators, functional fitness, general physical fitness, special technical readiness, technical and tactical readiness, psychological readiness.*

Introduction.

In the process of continuous growth of achievements in sport, the requirements to the system of training athletes increase. The work of predicting sports perfor-

mance and selecting talented candidates plays a crucial role in the first stage. Thus, among the applicants seeking to engage in professional sports, it is necessary to constantly improve the quality of selection, and search for the most promising children who will be able to show a high coefficient of performance [1, P.15-24].

The analysis of the current state of development of the issue of success criteria of table tennis players reflects the insufficient amount of information on the issue under consideration. To solve the problem, a questionnaire was compiled and a survey of table tennis specialists was conducted in order to develop criteria for the success of table tennis players at the training stage of sports preparation. The respondents were table tennis coaches of the Russian Federation with different qualifications and work experience. The coaches were asked to answer 16 questions of the questionnaire.

At the very beginning the relevance of the study was determined

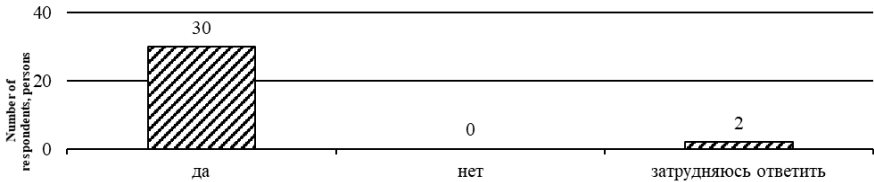


Figure 1. Degree of relevance of the development of selection criteria for table tennis players at the training stage of sports preparation (according to experts; n=32)

The research aimed at identifying informative indicators and developing criteria for selecting table tennis players at the training stage is considered relevant by 94% of the coaching staff; 6% answered neither “yes” nor “no”.



Figure 2. Influence of functional fitness and anthropometric data on player's performance (according to specialists; n=32)

Considering the importance of functional fitness, 78% of the interviewed coaches agreed with the high level of influence of functional fitness and anthropometric data on the performance of tennis players, 12,5% answered “disagree”, 9% of respondents found it difficult to answer this question.



Figure 3. Degree of importance of indicators of general physical fitness (according to experts; n=32)

In the process of development of the sport, the performance of technical elements becomes more and more difficult, and the draws faster. The analysis of the coaches' opinion showed that the players of the training stage of sports preparation need to develop the speed of movements. Preference is given by 44% of the coaching staff to the indicator in running for 10 m, in the second place jumping rope for 45 s. - 34 %, 25 % of the interviewed persons marked the most important running for 30 m., 6 % each mark the main indicators of flexion/extension of arms in the lying down position and long jump from a place. Some coaches also note that it is very important to add exercises for abdominal muscles, cross-country work to develop endurance, running for 60 m, 30 and 60 m sections, as sometimes a match can last for a long time, athletes need to learn how to properly distribute strength in the course of the game time and at speed with switching attention (shuttle run).

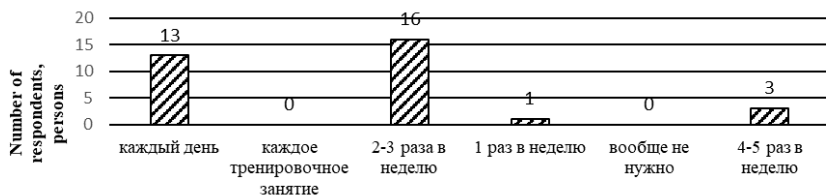


Figure 4. Opinion of specialists about the number of training sessions aimed at improving the indicators of general physical fitness (n=32)

Work aimed at improving general physical fitness should be carried out every day - 41% of the coaching staff, 50% of coaches note the need to perform such exercises only 2-3 times a week, 1 coach uses exercises aimed at the development of general physical fitness once a week, 3 coaches note that it is necessary to perform exercises 4-5 times a week.



Figure 5. Degree of importance of indicators of special technical readiness (according to specialists; n=32)

When considering special technical training, specialists emphasise on working out the speed of movements in the three-metre zone right-to-left - 53% and forward-to-back - 37.5%. However, athletes can make mistakes in the intermediate game, in this regard, do not forget to work on imitation on the elements of the game. Imitation of a combination of right and left rolling kicks is considered an important element of training - 28%, imitation of topspin on the right - 22%, imitation of topspin on the left - 12.5%.

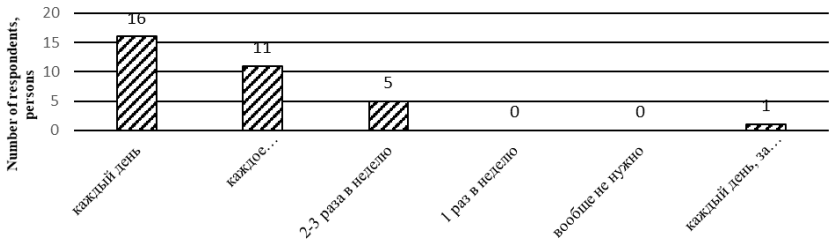


Figure 6. Opinion of specialists about the number of training sessions aimed at improving the indicators of special technical preparedness (n=32)

Exercises aimed at improving special technical fitness are used: every day - 50% of respondents, every training session - 37% of respondents, 16% - 2-3 times a week. Also coaches note that during the competition period it is necessary to exclude such exercises.

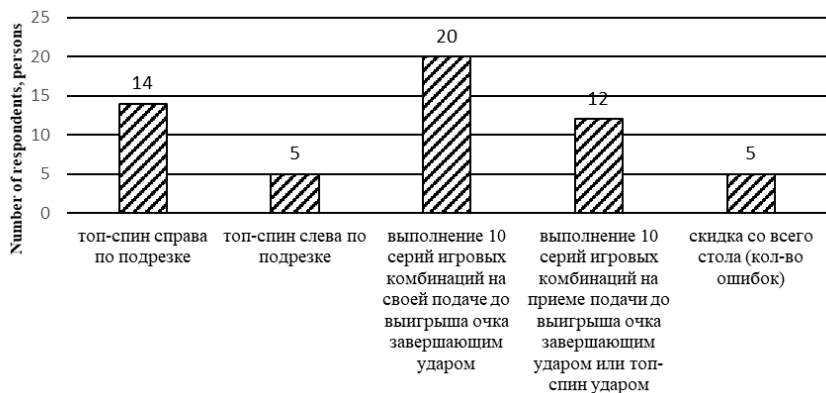


Figure 7. Degree of importance of technical and tactical training indicators (according to experts; n=32)

The unspoken rule of table tennis is the advantage of the serving athlete, the results of a survey of coaches only confirm this fact - 62.5%. But you should not forget about the game of receiving the serve either. Top-spin right is one of the basic elements, that is why coaches indicate that at the training stage, as a separate element it plays a less important role than the beginning of the attack after the serve - 44 per cent.

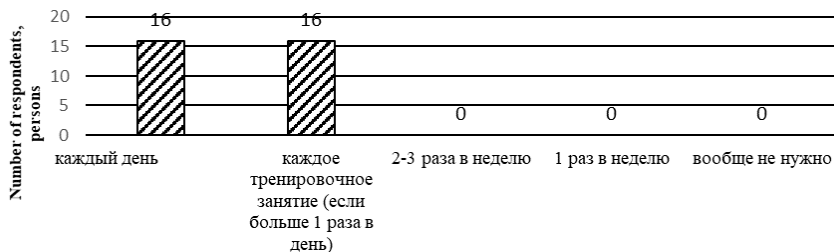


Figure 8. Opinion of specialists about the number of training sessions aimed at improving technical and tactical fitness indicators (n=32)

The coaches' opinions on the number of exercises aimed at improving the technical and tactical preparedness of athletes are equally divided. Some coaches point out the necessity to conduct such exercises every day, another part of coaches notes the importance of using exercises every training session.

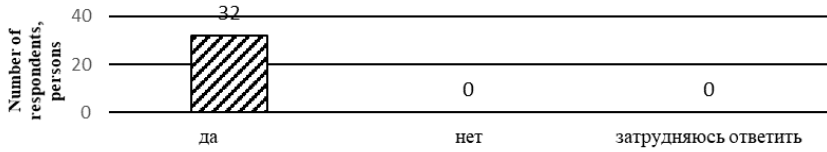


Figure 9. *Opinion of experts on the influence of psychological preparedness of a table tennis player on the performance of the game (n=32)*

The great role of psychological training of athletes in the training process and the level of its influence on the performance of the game is noted by absolutely all coaches.

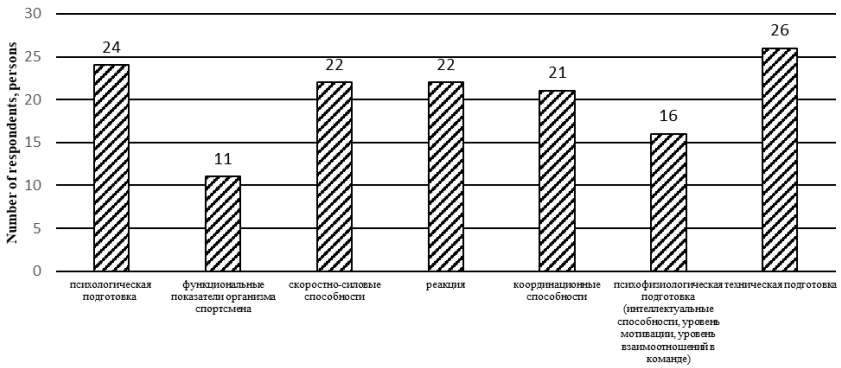


Figure 10. *Degree of importance of table tennis player's preparedness indicators at the training stage of sports preparation for achieving success (according to experts; n=32)*

According to experts, the main thing in table tennis is variability and quality of technical preparation. Secondary, but no less important are the psychological stability of the player, the ability to tune in for the upcoming match, the use of means of recovery between games. The main work on the development of such parameters as reaction and coordination is carried out at the initial stage of training, at the training stage, it is worth paying more attention to the improvement of speed and strength abilities. The functional state of the athlete's body does not play a major role in achieving the highest results at the training stage.

In order to determine the need for a comprehensive approach to the training of table tennis players at the training stage of sports training, questions 11-13 were developed.



Figure 11. Opinions of specialists about complex training of table tennis players at the training stage of sports preparation (n=32)

65.5% of coaches said that the results of athletes are influenced exclusively by complex training, the possibility of compensation of low level of one indicator at the expense of another was noted by 22% of respondents. One coach each gave the answers “it is difficult to answer” and “in general only complex training, but in some periods sometimes compensation is possible”.

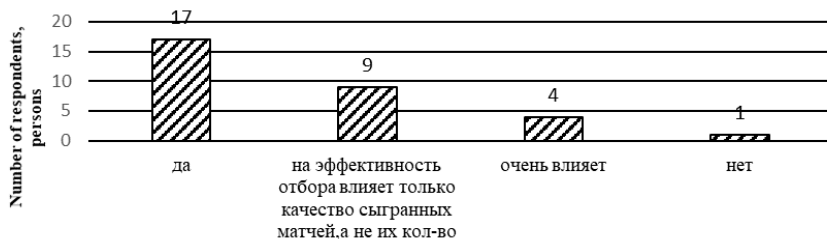


Figure 12. Influence of playing activity and number of competitions on the level of preparedness (according to experts; n=32)

The opinions of coaches about the influence of playing activity and the number of competitions on the level of preparedness differ greatly. According to 53% of coaches the number of matches played in a training year influences the level of athletes’ preparedness and provides the necessary efficiency of selection of table tennis players at the training stage of sports preparation. One coach notes the absence of such influence, 12, 5 % gave the answer “very influences” and “absolutely influences”. “Only in aggregate with the quality: diligence during the match, perseverance, display of strength of character in difficult periods of matches, change of tactics, technique, ability to adjust to the strengths of the opponent, ability to impose their game” - 28%.

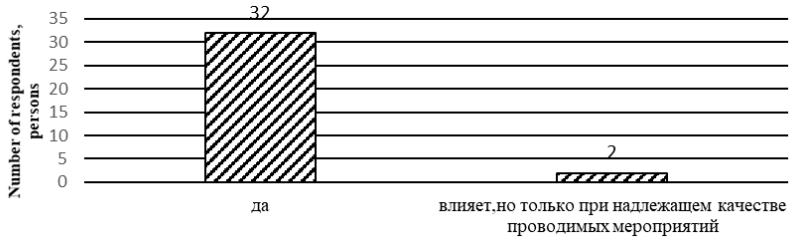


Figure 13. Influence of the number of training activities on the level of preparedness (according to experts; n=32)

Thus, according to the coaches’ opinion, there is a great need for the necessary number of training activities in the process of training.

In order to develop complexes of exercises aimed at improving functional, general physical, special technical fitness, the question was asked: “Is it possible to improve the all-round fitness level of table tennis players with the help of the method of using a large number of balls?”

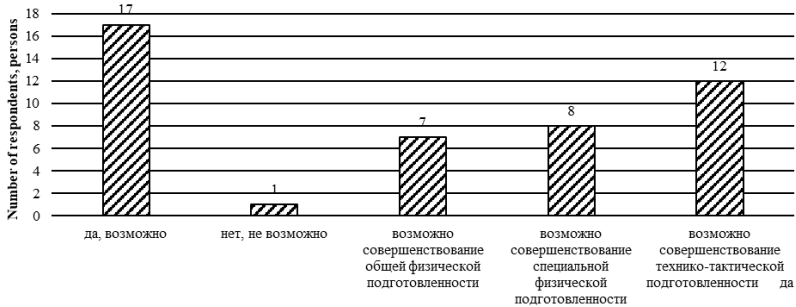


Figure 14. Opinion of coaches about the possibility of improving the level of fitness using the methodical technique “large number of balls” (n=32)

About the possibility of improving the level of fitness when using the method of a large number of balls in the training process answered “yes, possibly” - 53% of respondents, the possibility of improving technical and tactical fitness noted - 37.5%, the possibility of improving special physical fitness - 25%, 22% noted the possibility of improving general physical fitness.

For the development of complexes of exercises aimed at improving technical and tactical fitness, the question was asked: “How often, in your opinion, it is necessary to use the method of a large number of balls at the training stage?”.

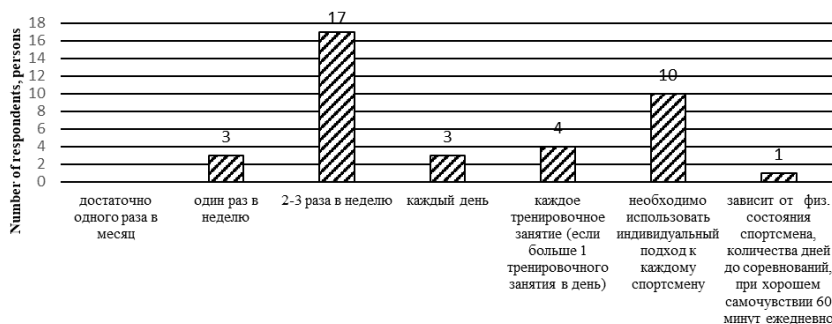


Figure 15. Opinion of coaches about the number of training sessions with the application of the methodical technique of “large number of balls” (LNB) (n=32)

Considering the question about the number of training days in which it is necessary to apply the LNB method, opinions are divided in such a way: 3 coaches - once a week and every day, 1 coach “depends on the physical condition of the athlete, the number of days before the competition, with good health 60 minutes daily”, the majority of the coaching staff “2-3 times a week” - 53%, 31% - “it is necessary to use an individual approach to each athlete”, every training session use the method 4 coaches.

Methods used by coaches in the training process: sparring, preparatory competitions, modelling of game competitive states in training (playing on one table (final match), team matches (increased responsibility), artificial restrictions when playing for the score (forehand, playing a certain shot, etc.), the ability to play other game competitive states in training (playing on one table (final match), team matches (increased responsibility), artificial restrictions when playing for the score (forehand, playing a certain shot, etc.)), ability to play other game sports (football, basketball), watching and analysing their games and training on video, watching and analysing games and training of the world’s leading athletes, overall physical condition, game, by groups, LNB, playing with a robot, competitive, gym, playing for the score, imitations of combinations of different strokes with movement at the table.

Conclusion: a survey among table tennis specialists of the Russian Federation has shown that the main criteria of successful competitive activity of table tennis players are considered such as: speed of body movements, speed and strength abilities, coordination abilities, maximum speed of thinking in a short period of time, reaction, which confirms the results of the study and modern approaches to comprehensive training of athletes.

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适应性体育专业从事非传统体育类型学生的健康状况
**THE STATE OF HEALTH OF STUDENTS SPECIALIZING
IN ADAPTIVE PHYSICAL CULTURE, ENGAGED IN NON-
TRADITIONAL TYPES OF PHYSICAL CULTURE**

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注解。对体育学院、适应性体育专业、从事非传统体育类型学生的健康指标进行了研究，以一组从事传统学士学位课程的学生作为对照。两组学生均有慢性感染灶 (FCI)：牙源性感染 (牙龈袋、牙齿、扁桃体)、心血管系统 (心电图)、口腔局部免疫 (研究唾液)、心理状态、工作能力 PWC 170。患有 FCI 的运动员属于心血管系统、肾脏、肝脏疾病的危险人群。研究结果显示，与主要组相比，对照组运动员更容易生病，局部免疫力下降，心肌过度紧张。FCI 降低了体能水平，对运动成绩的实现产生重大影响。

关键词：FCI，牙源性感染，适应性体育培养专业学生，心理情绪状态，口腔局部免疫，心肌物理过度紧张，身体机能。

Annotation. *Health indicators of students of the Academy of Sport, specialisation adaptive physical culture, engaged in non-traditional types of physical culture were studied, a group of students engaged in traditional bachelor's degree programme served as a control. Both groups of students had foci of chronic infection (FCI): odontogenic infection (gum pockets, teeth, tonsils), cardiovascular system (ECG), local immunity of the oral cavity (saliva was studied), psychological status, work capacity by the test PWC 170. Athletes with FCI belong to the risk group of diseases of cardiovascular system, kidneys, liver. The results of the study showed that athletes in the control group were more often ill, had reduced local immunity, myocardial overstrain, compared to the*

main group. FCIs reduce the level of fitness, having a significant impact on the achievement of sports results.

Keywords: *FCI, odontogenic infection, students of specialization in adaptive physical culture, psycho-emotional state, local immunity of the oral cavity, physical overstrain of the myocardium, physical performance.*

Introduction.

The state of health of sportsmen, revealing the structure, causes and peculiarities of the course of diseases continues to remain one of the central problems of sports medicine. Often, expressed compensated subclinical forms of diseases, inherent, mainly, to sportsmen, represent for them more serious danger, than for not engaged in sports, as under influence of the big physical load, stress factors, competitions, they can be aggravated, promoting chronic physical overstrain and decrease of sports efficiency. This, first of all, refers to foci of chronic infection.

Athletes with FCI have an increased risk of sudden death due to the so-called bacterial collapse (Gavrilova E.A., 2007; Makarova G.A., 2015).

One of the common foci of chronic infection is odontogenic infection of the oral cavity. According to the research data of a number of authors (D.S.Filatov, M.S.Guryanov, 2015; Nikulina G.Yu., 2020), dental pathology occupies one of the first places in the structure of chronic diseases in athletes. Thus, it is known that athletes in comparison with their peers who are not engaged in sports, more often there are inflammations of parodontium, dental caries, dental anomalies, dental traumas in the maxillofacial region (Shevchenko Y.L., 2007);

It is known that inflammatory periodontal diseases (IPD), as well as other diseases, are more severe in the presence of concomitant pathological conditions. One of such conditions is physical overexertion of athletes. It is caused by training programmes that do not take into account the age of the athlete, functional state, inadequate physiological and neuropsychic capabilities of athletes (Tsepov L.M., 1994; Welbury R, Hosey M.T., 2005).

According to WHO more than 80% of the world population suffer from periodontal diseases. Numerous studies carried out in different countries of the world have noted a significant increase in periodontal disease in people of different age groups who perform high physical loads, including highly qualified athletes (Gavrilova E.A., 2004; Okada M. et al., 2007).

Athletes with FCI are 3 times more likely to have various pathological changes in organs: chronic tonsillitis, chronic cholecystitis, favourable conditions for the existence of the infectious agent are in the teeth (caries, periodontitis) and gum pockets (gingivitis, periodontitis), somewhat less often in the ears (otitis media), frontal and maxillary cavities (sinusitis and maxillary sinusitis), bronchi (bronchitis), uterine appendages (salpingophyritis), etc.

FCI contribute to a decrease in immunological reactivity (Lesnykh Y.V., 2000), including dental caries.

The aim of the study is to investigate the character of FCI influence on health, psycho-emotional status, oral immunity, as well as adaptation of cardiovascular system to physical loads of students of LFC specialisation engaged in non-traditional types of physical culture

Materials and methods

The research was carried out on the basis of the Department of Sports Medicine of the Moscow Academy of Physical Culture.

50 students took part in the study. All athletes were divided into two groups: main and control. The main group consisted of 30 people, students of the group were engaged in non-traditional types of physical culture (yoga, qigong, holotropic breathing, etc.) in the framework of the programme “by choice”. The control group according to the generally accepted academy programme. The control group included 20 athletes. The average age of all athletes varied within 22.5 ± 1.4 years ($p < 0.05$).

The studied groups of athletes were formed taking into account the conditions of the training process, influencing, according to a number of authors, the dental pathology in athletes (Lesnykh Y.V., 1991; Milosevic A. et al. 1997).

We studied the general state of health, oral cavity (gum pockets, teeth, tonsils), cardiovascular system (ECG), local immunity of the oral cavity (saliva was examined), psychological status, work capacity according to the PWC₁₇₀ test.

All students were examined for the presence of concomitant somatic diseases on the basis of anamnestic data. In the observed groups the condition of tonsils, teeth and periodontal tissues was assessed, cardiovascular system was investigated, ECG at rest and after physical activity. The physical load was the PWC₁₇₀ test.

Objective examination of athletes consisted of examination of facial skin, red lip border, corners of the mouth and mucous membrane of the oral cavity, anterior and posterior palatine glands, condition of tonsils, posterior pharyngeal wall. The state of periodontal mucosa, level of hygiene, tooth mobility, exposure of tooth necks or roots, signs and degree of inflammation in periodontal tissues, presence and depth of periodontal pockets, gingival crowding were noted. When examining teeth, the presence of tartar, supra- and sub-gingival deposits was noted. Particular importance was attached to the detection of caries and its complications, as well as periodontal inflammatory processes as possible reservoirs of infection. The level of oral hygiene was assessed according to the Silness-Loe index (1962).

It is considered that the change of psycho-emotional status is one of the important signs of physical overstrain in an athlete (Makarova G.A., 2003). Three standard psychodiagnostic techniques, the most common in sports practice, were used to assess the psycho-mental status of athletes: the Eysenck test (neuroticism)

to assess typological personality traits, the Hanin competitive anxiety scale, and the assessment of personality situational characteristics in the dynamics of the training cycle. In addition to practical training, the main group studied theoretical foundations of oriental and other non-traditional methods of physical culture, which was a conscious perception of practical training. The study was conducted twice: at the beginning of the academic year and at the end of the year.

Results and discussion

The closest connection between dental and cardiovascular pathology in athletes was established with respect to heart rhythm disturbances Repolarisation disturbances on ECG at the first examination were observed in both groups of athletes with periodontal pathology (29.4%). At the second examination in the main group the percentage of correct repolarisation reactions (normotonic type) was 85,5%, in the control group - 56,3%. This result indicates that oriental methods of physical culture have a positive effect on adaptation to cardiovascular system loads.

Athletes' work capacity, PWC₁₇₀ test, at the first examination in all athletes was almost the same. At the second one, in the main group physical performance was higher per kg of body weight by 3.8.kgm/kg. The principal difference was in the response of the cardiovascular system during the recovery period. Athletes with FCI both in the main group and in the control group had atypical reactions of hypo- and hypertonic type. The recovery time was delayed, adaptation to load was insufficient

Studies conducted in the field of sports psychology have shown that athletes have a special mental profile that differs from the pro- profile of non-athletes. It has been termed the "iceberg profile" and is characterised by low scores of stress, depression, fatigue, aggression, confusion and high values of mental strength, higher than in non-athletes (Morgan W.P., 1980). The state of physical overexertion is characterised by an inverse "Iceberg" profile with low levels of energy, high values of fatigue, depression and anger. In both study groups, all students had different forms of FCI. (Fig.1)

Fig1 . Characterisation of the studied pathology at the beginning of the academic year

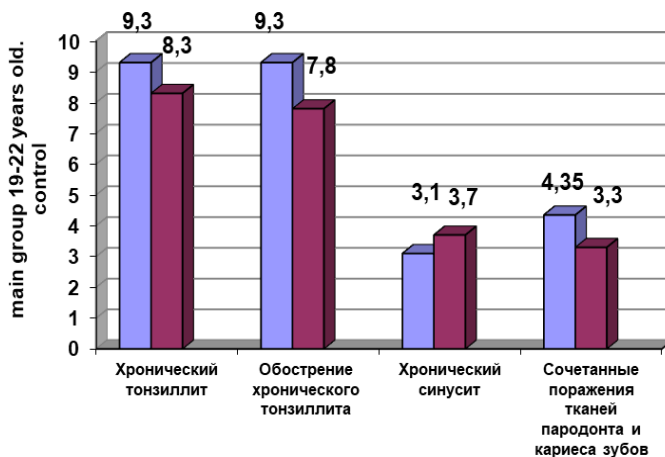


Figure 1. Characteristics of the studied pathology

It follows from the table that chronic tonsillitis, exacerbation of chronic tonsillitis, combined lesions of periodontal tissues and dental caries are the most frequent pathology of both groups. The frequency of marked manifestations in the structure of FCI in groups shows unfavourable state of health, and also formal carrying out of preventive examinations and medical examination of sportsmen.

The closest connection of stomatological and cardiovascular pathology in athletes is established with respect to heart rhythm disorders Repolarisation disorders on ECG at the first examination were observed in both groups of athletes with periodontal pathology (29,4%).

The performance of athletes, studied by PWC_{170} test at the first examination in all athletes was almost the same. At the second examination in the main group the physical efficiency was higher per kg of body weight by 3.8.kgm/kg. The principal difference was in the response of the cardiovascular system during the recovery period. Athletes with FCI both in the main group and in the control group had atypical reactions of hypo- and hypertonic type. Recovery time was delayed, adaptation to load was insufficient. In the second study in the main group the pro-percentage of correct reactions to recovery (normotonic type) was 85.5%, in the control group - 56.3%. This result indicates that eastern methods of physical culture have a positive effect on adaptation to cardiovascular system loads.

Studies conducted in the field of sports psychology have shown that athletes have a special mental profile, which differs from the pro- profile of non-athletes. It

has been called the “iceberg profile” and is characterised by low scores of tension, depression, fatigue, aggression, confusion and high values of mental strength, higher than in non-athletes (Morgan W.P., 1980). The state of physical overexertion is characterised by an inversive “Iceberg” profile with low energy levels, high levels of fatigue, depression and anger

Table 1.

Indices of personality characteristics in groups of athletes (in points) in dynamics

Indicator	Control		Main		P
	1 survey	2 survey	1 survey	2 survey	
Neuroticism (Eysenck score)	10,35±2,01	9,01±1,4	10,49± 3,53	7,01±1,23	< 0,05
Competitive anxiety (score) according to Khanin	52,19±2,36	50,01±0,13	53,23± 3,26	38,14±0,54	< 0,05

Average scores on the extraversion-introversion scale: 7-15 points. High scores on the extraversion-introversion scale correspond to the extraverted type, low scores - to the introverted type.

Average scores on the neuroticism scale: 8-16. The result of less than 8 points indicates emotional stability of a person, more than 16 points - emotional instability (neuroticism). According to the data of our study the state of “neuroticism” in both groups did not differ. After 4 months of training in non-traditional methods of physical culture, the indicators of emotional stability, excellent adaptation, absence of great tension, anxiety, tendency to leadership, sociability were significantly higher than in the control group.

The level of anxiety according to Khanin in the main group, after the classes of non-traditional methods of physical culture, significantly decreased, which indicates the beneficial effect of this subject on the psycho-emotional state.

At the same time, the works of a number of authors proved that psycho-emotional state significantly affects the nature of adaptive reactions of oral tissues, the disruption of which may be a prerequisite for the occurrence of FCI, Studies on the study of the influence of chronic psycho-emotional stress on periodontal tissues show that stress can provoke haemomicrocirculatory disorders and disrupt metabolic processes in peri-dental tissues. With increasing severity of periodontal diseases, a significant change in the index of emotional stability was observed (Orekhova L.Y., 1999). The immunological status of local immunity of the oral cavity in saliva is presented in Table 2.

Table 2.

Indices of local immunity in the main and control groups

Immunity indicator	Norm	Main gr.		Control gr.	
		Survey		Survey	
		1	2	1	2
T- lymphocytes	51,2±2,1	32,4±2,3	49,12±1,23	41,2±2,4	49,65±1,28
B- lymphocytes	22,4±1,7	39,7±2,1	25,41±3,1	29,3±2,2	26,41±3,1
IgA	1,5±0,03	2,1±0,04	1,3±0,4	1,8±0,05	б/изм.
IgM	1,3±0,07	1,9±0,05	1,4±0,2	1,6±0,05	б/изм.
IgG	10,4±1,1	22,1±1,2	12,5±2,1	16,2±1,1	13,45±2,3

The table shows a significant decrease in the content of the total pool of T-lymphocytes, mainly helper population. At the same time, there was an increase in B-lymphocytes and normalisation of the humoral link of immunity - immunoglobulins IgA, IgM and IgG. In the main group immunity indices approached the norm.

Conclusions

Thus, the conducted study showed that FCIs are frequently encountered in training athletes. The presence of untreated pathological inflammatory processes leads to heart rhythm disturbance and impaired myocardial repolarisation processes. All these disorders can lead to the development of dystrophic processes in myocardium.

During the study of psycho-emotional status it was noted that athletes engaged in training schedule more often experience tension, depression, fatigue, tiredness, aggressiveness, confusion and high mental tension. In the group of non-traditional physical culture classes there was a significant decrease in anxiety, balancing of psycho-emotional background.

The study of immunological status indicates a significant decrease in oral immunity in athletes with foci of chronic infection.

This study showed the positive influence of non-traditional methods of physical culture, on the health status of students, as well as the need to include non-traditional types of physical culture in the main schedule of subjects studied at the Academy of Physical Culture.

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俄中人道主义领域合作的现状
**CURRENT FORMS OF RUSSIAN-CHINESE COOPERATION IN
THE HUMANITARIAN SPHERE**

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注解。本专题的现实意义在于，现代俄中关系的特点是全面伙伴关系；人道主义合作正在成为最重要的伙伴关系领域之一，影响着加强各国人民和国家的互信。本文的目的是阐述俄中在人道主义领域互动的实际形式并确定其特点。使用理论研究方法：根据工作问题选择和分析规范性法案、国际条约、科学文献。

研究表明，中俄跨文化互动主要通过以下形式实现：“全面伙伴关系”、国家间组织（金砖国家、上海合作组织等）框架内的多边合作、合作形式等。中国“一带一路”倡议“楼上暖，楼下冷”。

关键词：俄中人道主义领域互动的形式、俄中人道主义领域互动的特点。

Annotation. *The relevance of this topic lies in the fact that modern relations between Russia and China are characterised as relations of comprehensive partnership; humanitarian cooperation is becoming one of the most important areas of partnership, influencing the strengthening of mutual trust of peoples and states. The purpose of this paper is to formulate the actual forms of Russian-Chinese interaction in the humanitarian sphere and to identify their features. Theoretical methods of research were used: selection and analysis of normative acts, international treaties, scientific literature in accordance with the problematic of the work.*

As a result of the study we came to the conclusion that Russian-Chinese intercultural interaction is realised in such forms as: “comprehensive partnership”, multilateral cooperation within the framework of interstate associations (BRICS, SCO, etc.), the form of cooperation initiated by China “One Belt - One Road” and “Upstairs is warm, downstairs is cold”.

Keywords: *forms of Russian-Chinese interaction in the humanitarian sphere, peculiarities of Russia-China interaction in the humanitarian sphere.*

Intercultural interaction of states in the humanitarian sphere is the object of study of many sciences: culturology, sociology, pedagogy, linguistics, anthropol-

ogy and others. At the same time, intercultural humanitarian cooperation is both a condition and a result of social practice in the main spheres of society: political (the will of states enshrined in legal acts), economic (production, distribution, exchange, consumption of cultural goods and values as economic goods), social (interaction of individuals, social groups, various communities in the process of creating and mastering cultural goods and values), and cultural.

In this paper we understand intercultural interaction of states in the humanitarian sphere as “an active, organised, managed, goal- and value-oriented process of mutual influence and interaction of states and their social institutions, aimed at the implementation of the interests of states and their citizens in the humanitarian sphere, affecting all spheres of life of the subjects of interaction” [23, P. 72].

According to the point of view of E.N. Kurban and M.V. Krivoshlykova, intercultural interaction implies the emergence of a sociocultural phenomenon called intercultural dialogue, unfolding in the context of interaction between countries, peoples and ethnicities, contributing to the construction of a whole system of multicultural contacts, emphasizing the gravitation of original cultures to foreign values and patterns. This context suggests that if a culture focuses only on absorption from the outside, but is closed to the world in everything else and does not share anything with it, it is eventually rejected by it [6].

Characterizing Russian-Chinese intercultural interaction, it should be noted that its defining type (model) is dialogue, which is implemented in various forms. Based on the idea of the primacy of the political (state, legal) beginning, which determines the direction of cultural interaction, it is necessary to formulate the forms of political interaction that determine intercultural interaction:

- **“comprehensive partnership”**. The Agreement on Cultural Cooperation signed in 1992 between the Government of the Russian Federation and the Government of the People’s Republic of China [17] outlines the forms of exchange and cooperation in culture and art. Such forms in the field of culture include the organisation of tours of professional and amateur art groups; holding cultural and art exhibitions; exchange of cultural and artistic figures; exchange of editions and publications in the field of culture and art; mutual acquaintance of the peoples of their countries with works of literature and art of the other side; exchanges and cooperation between museums and libraries of the two countries. The “Comprehensive Partnership” between the PRC and Russia in the field of education is implemented through sending scholars, teachers and specialists to exchange experience, conduct research and teach; reciprocal scholarships; exploring the possibility of signing an agreement on the equivalence of educational documents, degrees and titles issued and awarded by the respective institutions of the parties (*which has already been done*); and promoting direct contacts between higher education institutions and universities.

The Russian-Chinese and Chinese-Russian Friendship Societies have been in operation since 1992. With the transition of relations between the states to the stage of "comprehensive partnership" "equal trust partnership and strategic interaction", humanitarian intercultural interaction is being built at the levels of states, regions, cities, individual institutions and public organisations. It includes co-operation in the areas of culture, science, education, health care, ecology, disaster response, tourism and sport. The Treaty on Good Neighbourliness, Friendship and Cooperation between the Russian Federation and the People's Republic of China stipulates that "the parties fully promote the development of exchanges and cooperation in the field of culture, education, health care, information, tourism, sports and law" [4]. [4].

Cooperation in the study and teaching of the Russian and Chinese languages is deepening. In 2018, there were 18 Confucius Institutes and 4 Confucius classes in Russia [7, P. 321], in 2019 - 19 Confucius Institutes and 4 Confucius classes [18, P. 35].

For 2023 in the Russian Federation there are also 19 Confucius Institutes and 4 Confucius classes, the main tasks of which are the study of the Chinese language, Chinese culture, the formation of a positive image of China, its culture, society in the perception of Russians. In light of this, Confucius Institutes and schools in the Russian Federation appear as instruments of "systematic attempts to increase the attractiveness of China through language and culture" [20]. [20]. The Chinese language is studied in a number of Russian universities, schools and colleges, along with the centres of Chinese language study in Russia, Russian language centres have been opened in China.

The practice of cross years has become stable: the National Years 2006 and 2007, the Year of the Russian Language in China 2009 and the Year of the Chinese Language in Russia 2010 and others [9, P. 43; 7, P. 321]. An important document on Russian-Chinese co-operation is the "Action Plan of Chinese-Russian Humanitarian Co-operation" [10] [10]. The joint Russian-Chinese Annual Report on Cultural Exchange between China and Russia 2018-2019 [3], Russian-Chinese Dialogue: Model 2020: Report No. 58/2020 [13], joint Russian-Chinese report "Russian-Chinese Dialogue: Model 2021: Report No. 70/2021"[14], Joint Statement of the Leaders of Russia and China of 4 February 2022 on International Relations Entering a New Era and Global Sustainable Development, which led to numerous disputes in the scientific and political communities [2, P. 8 .], earlier joint statements on strategic cooperation of a comprehensive nature [22, P. 111], give us the opportunity to point out the existence of **a form of Russian-Chinese interaction**, which is characterised by bilateral intergovernmental cooperation, which is aimed at helping to achieve the national goals of the two countries. The main vectors are the national interests of the Russian Federation and China in

the political sphere - domestic and foreign policy stability, including the struggle against the principles of a unipolar world, economic - the development of trade in resources and international investment, humanitarian cooperation - creating a foundation through socio-cultural activities for the development of friendly relations between peoples, and therefore stability in the relationship for many years, the development of scientific and technical cooperation to develop science for space exploration, development of scientific and technological cooperation in the field of space exploration, the development of international cooperation in the field of space exploration.

The main principles of this form of relations are multipolarity, non-aligned thinking, mutual respect, joint work to combat global problems, preservation of traditional national values [19, P. 32].

- multilateral cooperation between Russia and China within the framework of the Shanghai Cooperation Organisation (SCO) and the BRICS organisation.

Within the framework of the SCO, the parties co-operate in accordance with the norms of international law and the national legislation of their states:

- in the fields of music, theatre, fine arts, cinematography, archives, libraries and museums, protection of cultural heritage objects, folk crafts, arts and crafts, amateur, variety and circus arts, as well as other types of creative activity;
- in the field of training and professional development of workers in certain specialities of culture and art, and support direct interaction between educational institutions of culture and art of the SCO states;
- in the identification and return of cultural property that has ended up in the territories of SCO member States as a result of illegal export, as well as taking measures to prevent the illegal import and export of cultural property, and assisting in the return of illegally exported cultural property;
- in the field of protection, preservation and restoration of monuments and cultural heritage objects;
- in the implementation of international projects in the cultural sphere;
- in the field of cinematography, including between the national film archives (film funds) of their States;
- in the area of traditional culture and artistic folk crafts, organising exhibitions of folk craftsmen and folk art festivals, and facilitating the participation of folklore groups in actions, events and folk festivals held in the territories of SCO member States;
- with a view to deepening co-operation in the field of cultural studies may, on the basis of bilateral agreements, exchange archival, scientific and other materials relating to the culture, history, geography and social development of the SCO member States;

- cooperation in the field of publishing, the publication of books, translations of works of fiction, scientific and special literature and other printed products, as well as the organisation and holding of book fairs in the territories of the SCO member states;
- on the exchange of information in the field of copyright and neighbouring rights protection;
- in the implementation of multilateral cultural programmes and projects related to the development of creativity among young people and children;

The Agreement [16] also defines the mechanism of financing the activities envisaged by the Agreement, forms of exchange of creative scientific experience - these are seminars, competitions, conferences, colloquia, round tables, sessions, festivals and others.

Within the framework of BRICS, tasks similar to those set out in the SCO documents are being solved [11].

This form is aimed at strengthening regional stability, and is also seen as an instrument of financial and trade interaction, isolated from the West, and as a mechanism to improve the effectiveness of megaprojects, such as “One Belt, One Road” [2, P. 10].

Russian-Chinese relations within the framework of international organisations are also a delimitation of the balance of power and influence in the region. Russia and China have a significant influence on the countries of Central and Central Asia due to the historical past, and these countries balance the influence of the two countries in order to preserve their national interests.

- The One Belt One Road, a form of co-operation initiated by China. Under this form, the PRC co-operates with the Russian Federation in the fields of science, education, culture, health care and informal contacts. The main message is that “friendship, which stems from close contacts between people, is the key to healthy relations between states” [15, pp. 732-733]. In addition to the generally accepted tools, it is worth noting those outlined by Xi Jinping during his speech at the opening ceremony of the High-Level Forum on International Cooperation within the framework of the “One Belt, One Road” initiative to discuss the “One Belt, One Road” construction plan: the Chinese government’s annual provision of 10,000 government scholarships to the countries participating in the “Belt and Road” initiative, special scholarships established by local Chinese governments to stimulate international cultural and educational programmes, and the provision of scholarships to the countries participating in the “One Belt, One Road” initiative.

Here it is important to note the “One Belt, One Road” Project proposed by Xi Jinping, which is implied not only as a new transport and logistics route, but also as an instrument of geopolitical influence [21]. The launch of the Project has had a significant impact not only on the countries through which the transport branch of

the Project passes, but also on other countries whose transport and logistics, and thus economic and geopolitical interests have been shifted from their dominant positions [5]. The project forced Russia to take part in it, as the importance of Russian transport networks (Trans-Siberian railway, Northern Sea Route) was shifted, due to China's large-scale investments in the infrastructure of Central Asian countries, Russia had to become more active in this direction and weaken its position in Europe due to limited resources. The US and Southeast Asian countries have felt the loss of their importance as regulators of the main transport route from Europe to Asia.

This form should be interesting for Russia, as it gives it the opportunity to build co-operation not only with China, but also with the countries involved in the Belt and Road project.

- **the form defined in the media as “It’s warm upstairs, cold downstairs”**, or in the Russian version: “It’s thick upstairs, empty downstairs”; this form characterises intercultural interaction as more declarative, with no real content.

In the scientific community it is presented as the theory of “two-storey Russian-Chinese relations” [12, P. 24]. This form of relationship is found in the studies of this problematic by Chinese and Russian scientists, and is noted as a constraining factor of co-operation [1]. It can be described as friendly relations between the leadership of the countries, ambitious plans for cooperation in many areas, a large number of Russian-Chinese cooperation projects, but among people, commercial and non-profit organisations it is not possible to build the same ambitious and effective cooperation, many initiatives of the authorities and investment projects are not implemented due to various reasons.

Zu Chunming states that compared to close political relations, cultural exchanges between the two countries still have great potential for development, efforts should be made to overcome such a problem in the exchange - “hot in the upper class and cold in the middle and lower classes” [18, P. 38-39.], so that cultural exchanges play a role in the closeness of hearts between nations.

In our opinion, the main reason for the current form of interaction is the insufficient preparation of the socio-cultural foundation, and it is precisely through the efforts of Russian-Chinese interaction in the humanitarian sphere that it is possible to strengthen the foundation, to prepare the public for closer interaction through long-term systematic work.

It is these forms of “political climate” that determine the model of intercultural interaction between Russia and China in a particular period of time. Proceeding from the fact that in this period the idea of comprehensive partnership between the states is actively promoted, and “the relations between our countries are largely relations between the leaders of the two countries” [8, P. 315], which are active both in the bilateral format and on the “fields” of the SCO and BRICS, including

cultural issues, it is possible to observe the expansion of cultural ties and deepening of intercultural interaction.

Thus, the actual forms of Russian-Chinese intercultural interaction are determined by the models of political interaction in a particular period of time. The tools for their implementation are enshrined in the normative legal acts of the Russian Federation and the People's Republic of China, in bilateral treaties and agreements, and in the SCO and BRICS treaties and agreements.

The forms of Russian-Chinese intercultural interaction include: “comprehensive partnership”, “multilateral cooperation between Russia and China within the framework of the SCO and BRICS organisation”, the form of cooperation initiated by China “One Belt - One Road” and “It's Warm Upstairs, Cold Downstairs”.

The peculiarity of modern intercultural interaction is that:

- while there is a legal framework and various “platforms” for cooperation, a declared level of interaction (“strategic partnership”), recognition of the strategic importance of culture and intercultural interaction as important components of national security, with cultural cooperation plans, annual joint analyses (reports) of the state of cooperation in the humanitarian sphere, there is no common strategy for both states for its development;
- both states strive to further develop friendly relations between peoples and strengthen cultural co-operation between the two countries, “being confident that cultural ties are an important channel for deepening mutual understanding and friendship between the peoples of the two countries” [17], which shows recognition of the importance of cultural diplomacy;
- intercultural interaction in a particular period depends on the “political climate” in the relations between states and relations with third countries;
- the principle of mutual benefit [17], in intercultural interaction allows states to solve their issues through culture, i.e. to consider it as a soft power;

These features indicate that states recognise the significance of cultural diplomacy and consider culture and cultural interaction as a tool and manifestation of soft power.

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社会实践是大学生为未来职业活动做好准备的一种手段
**SOCIAL PRACTICE AS A MEANS OF PREPARING UNIVERSITY
STUDENTS FOR FUTURE PROFESSIONAL ACTIVITY**

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注解。 在这项研究中，作者讨论了社会实践对于大学生为未来职业活动做好准备的重要性。 本文包含具有社会意义的实践的分类和原则，并分析了它们对形成社会积极和道德人格的教育潜力。 它在教育科学的背景下考虑了“社会设计”和“社会实践”这两个术语。 作者建议在高等学校引入必修学科“社会实践”，以培养学生的领导素质和在未来专业领域解决社会问题的能力。 必修学科“社会实践”的引入，将使学生在社会交往和社会思维发展方面接受系统的训练，认识到自己在社会中的作用，成为国家和世界社会变革的积极参与者。

关键词：社会、实践、社会实践、学生、活动。

Annotation. *In this study, the author discusses the significance of social practices in preparing university students for future professional activity. The article contains classification and principles of socially significant practices, as well as analyses their educational potential for the formation of a socially active and moral personality. It considers the terms “social design” and “social practice” in the context of pedagogical science. The author proposes the introduction of compulsory discipline “social practice” in higher schools in order to develop leadership qualities and readiness of students to solve social problems in the future professional sphere. The introduction of compulsory discipline “social practice” will allow students to receive systematic training in the field of social interaction and development of social thinking, realise their role in society and become active participants of social changes in the country and the world.*

Keywords: *social, practice, social practice, student, activity.*

Introduction.

During the period of studenthood there are active metamorphoses of personal-ity socialisation, which consist in the introduction of a person to social life and acquisition of beliefs and moral guidelines necessary for normal existence in society. The concept of modernisation of general education content suggests the

application of differentiated types of social practice in the educational process in order to form social competences of students for their further self-determination. Social practice is a circumstance when a person acquires social experience aimed at changing the worldview, forming relations to the socio-cultural meaning. It is important that social practices are based on a person-centred approach, taking into account the aptitudes and abilities of each learner. Social practices are characterised by three fundamental principles: socially significant content, external and internal efficiency and cost-effectiveness. They may well be reproduced on a significant scale in practice in all educational organisations of our country.

In Russia today, a new arrangement of the education system has been formed, which is focused on the socialisation of the personality by including it in social activities [1, P.52]. Of the most effective ways to involve young people in socially significant life is a social project. Such technology illustrates a constructive and creative direction, which contains the study of possible difficulties, identifies their causes, establishes aspirations for new goals and objectives, developing ways and means to achieve them. Social planning in educational institutions appears to be a part of social education [2, P. 76], it helps students to get informed about social and cultural objects and phenomena with the acquisition of the practice of assistance with them (S. M. Azarkina, G.M. Bepalova, N.M. Vinogradova, T.I. Kobeleva, A.A. Kochyan, A.V. Kochyan, V.A. Lukova, O.N. Malova, Y.V. Min-evich, G.M. Bepalova and N.M. Vinogradova). A social project is basically built of three components: social crafts, practices and projects. Due to the set goals of these components it is possible to create both mutually complementary and independent actions. The definition of “social practice” in the pedagogical context is related to the notion of social projection. This is a relatively new concept for pedagogy, coming from sociology. Sociology defines social practice as the functioning of an individual aimed at changing the social climate for his/her own growth. Various definitions of this term can be found in various materials [3]. They all boil down to the activity that is aimed at reorganising the social environment to ensure optimal development of the subject (N.L. Antonova, P. Bourdieu, E. Giddens, V.I. Dobrenkov, T.I. Zaslavskaya, A.I. Kravchenko, Y.M. Reznik, M.A. Shabanova). This is the most important aspect of the formation of a new educational system in Russia, facing the task of socialisation of the individual, through active participation in the nationwide processes.

Social practices encompass diametrical ways of interaction and knowledge generally accepted in the cultural space. They can be traditional and ritualistic. Social practices include constructive interaction of public corporations and institutions that influence relationships and diversification in society. The definition of “social practice” refers to circumstances in which people are enriched with general social skills when immersed. In the interest of a broad understanding of this

concept, it is useful to consider definitions from different authors [4, P.512] S.M. Azarkina, G.M. Bepalova and N.M. Vinogradova, for example, present social practice as a certain stage of mastering social skills and cognition of social reality. They consider social practice as a part of a social project. Besides, other authors N.F. Loginova, S.H. Samsonova consider social practice as a function oriented to the acquisition of social experience and development of social competence. M.P. Guryanov believes that social practice as socially useful work should be oriented to the resolution of social problems. N.Y. Perevoznikov finds social practice in the form of specific initiatives of citizens, including the younger generation with an educational and civic aspect. Analysing the literature, we can highlight the role and meaning of the concepts of “social practice” in the pedagogical context, which combines situation, activity, process, function, etc. [5]. However, all these definitions indicate a transformative and socially significant course of social practices that reflect the coordination of the individual with the social order. Social practices appear to be different and can be classified and analysed by general scientific technologies at the stage of socialisation.

Our research considers social practice as a means of preparing university students for the forthcoming professional formation. According to different authors, social action can be considered as an independent final activity with the aim of solving social problems and gaining experience of social activity. Social practice is widely used in educational institutions as a component of social projects. A.N. Zharova, N.A. Krivopalova, G.D. Chamovsky, N.Y. Perevoznikova, N.F. Loginova, N.N. Ushakova, S.H. Samsonova and other authors have presented examples of social practice application, their research shows that the inclusion of students and pupils in social practices contributes to the formation of social competences and skills, such as social interaction and communication. Also, social practices help the young generation to develop and assert themselves. For example, social design helps individuals to form their self-concepts and worldviews, to establish a new possibility of interaction with the adult world. The experience of social practices has also shown that it contributes to the conscious choice of individual educational trajectory of students and the formation of acts of action, such as responsibility, decision, choice and understanding. [6, P. 43 - 46]. Social practice plays an important role in the professional self-determination of future professionals, it gives them the opportunity to form an idea of the upcoming work, to learn the requirements and specifics. To solve such tasks, M.P. Guryanov, for example, singles out social and professional practice as a relevant approach. Therefore, social practice plays an important role in the education of students, development of social skills, self-determination and formation of professional perception (G.N. Kudashov, O.V. Ogorodnova).

There are various social practices in the system of students' education, which can be conditionally divided into standard and non-standard. Standard social practice includes the involvement of students in the extracurricular and educational process of the university, as well as in educational and industrial practice. [7, P.76]. Within the framework of educational work, students can engage in self-development and improvement of personal growth. Self-organisation is the process of creating an environment that allows students to live, work, rest at their discretion. Along with self-organisation comes personal development, allowing students to organise their own activities, events and learn the skills of effective time management.

An important social practice is volunteering. Volunteer movement unites people who have a pronounced social character and focus on promoting the formation of social potential in the student. They invite students to socially useful activities and give them an opportunity to realise their life position and personal responsibility. Self-governance involves organising and conducting various activities for students at interuniversity and university level. Student self-governance enables students to demonstrate their capabilities and abilities not only during educational and extracurricular activities, but also in non-standard situations. Professional role-playing activities provide for students' participation in trainings and the development of a professional model of student behaviour. In educational and production processes students can try on the role of a professional. The intellectual activity of students in social practice also plays an important role. All these socially significant practices in the educational system of students play a special significance for the formation of personality, development of their social-activity and professional skill. They give learners the opportunity to express themselves, develop their skills and gain valuable experiences outside the curricula.

Standard practices, including social practices, are an essential tool for preparing graduates for professional activity and social partnership. However, these practices usually have several drawbacks, firstly, most university students do not engage in social practices due to a variety of reasons, such as unwillingness to participate in extracurricular activities, low activity and responsibility, lack of initiatives. Secondly, these practices are usually episodic rather than systematic. To eliminate these shortcomings, non-standard social practices can be applied in students' learning process. Non-standard social practices are primarily a social initiative based on the cooperation of students with the agencies of the social and educational stage with the application of elements of social projection. However, according to L.F.Faizullina, such practice has not yet been developed in theory and methodology, although it represents a promising direction of informal orientation. [8, P.102-106]. Universities should implement non-standard social practice through the mandatory involvement of students not only at the level of optional

classes, but within the framework of a specially introduced discipline “social practice”, as it has a socially significant pedagogical orientation. There are different ways of organising non-standard social practices for a future specialist, but the most expedient and promising is a stage-by-stage practice. The stage of coordination can include volunteer and professional, social and project life activities throughout the whole academic period. Social practices in the system of education of university students go through three stages, each of which has its own features and goals [9, P. 162-165.]. The first stage is when students take assistance in socially significant activities in order to understand the social importance of their future education. During this stage they take an active part in such activities as volunteering and active labour. The second stage involves students undertaking “social practices” in social institutions and establishments, where they will be able to master various social roles and work on the theoretical parts of social projects, including ideas and current issues in society. The third and final stage involves independent participation and realisation of a social project. In this stage, students can express themselves in different types of work - creative, social and professional.

Combining standard and non-standard social practices in the education system has a significant, not yet fully developed potential for the educational space. Participation in social practices allows students to be constantly in the sphere of their future specialty, effectively develop their professional vocation, learn skills and establish a dialogue with others, gain experience in constructive interpersonal communication, organize and plan their actions, study modern societies and find their place in them. Note that social practices play an important role in the formation of students’ professional competence, preparing them for a career in the future. It helps students to gain practical experience, develop skills of team interaction, adapt to different situations and apply theoretical knowledge [10, P.80]. Social practice helps to develop leadership qualities and readiness of students to solve socially significant problems in further professional creativity.

Conclusion

The author considers it important to introduce the concept of “social practice” in higher schools as a compulsory discipline. The studies of N.F. Loginov, S.H. Samsonov show that social practices contribute to the development of civic positions and personal growth. The introduction and development of this kind of work in universities will create conditions to reveal different actual tasks: to stimulate social, creative, educational and scientific cooperation, to increase the prestige of future professions of their specialisation among students, their professional and social development. The concept of “social practice”, in recent decades has become of pedagogical importance, and the introduction of compulsory discipline “social practice” could help to solve many socially important problems in our country.

Social practice is an integral part of the educational process, which allows students to apply their knowledge and skills in practice, working with real social problems. It helps students develop professional skills, learn to work effectively in a team and make informed decisions. In addition, social practice contributes to the formation of social responsibility and active citizenship in students, which is important for their future role in society. The introduction of a compulsory discipline of “social practice” in higher schools will help to prepare more competent and socially aware professionals capable of making a significant contribution to the development of society.

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作为物质理想属性的信息

THE INFORMATION AS THE IDEALITY PROPERTY OF THE SUBSTANCE

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抽象的。世界上存在着信息的秘密——不是某些新闻、某些事件、神秘事件的秘密，而是信息在我们多方面、动态的世界中存在的秘密：这是什么样的实体——难以捉摸，但有影响力，无肉无味，无色？如何理解和合理地指定信息的性质，例如与事物、热或冷、运动或静止、任何物质过程的比较？

如今，世界上出版了数百本科学书籍和数千篇期刊文章、哲学家和自然科学家的讨论论文，致力于普遍、广泛使用但仍然知之甚少的信息现象。这种需求是人类文明正在从第二个超级发展周期向第三个超级发展周期过渡所带来的，其特征是信息文明的形成，社会信息化日益完善，社会各方面“数字化”。人们的经济、工业和精神生活，以及二十一世纪的未来——由于信息技术的快速发展，社会基础发生了革命性的转变，人类的主要生命系统逐渐被人工生命系统取代以及在地球上创造另一种普遍文明——具有人工智能的“机器人文明”。

在这条不可避免的历史道路上，21世纪20年代世界科学和哲学中所发展的信息本质却缺乏普遍接受的解释，这似乎是自相矛盾的。在20世纪40年代建立了信息定量理论的基础（K. Shannon, N. Wiener 等）之后，物理学和哲学在对定性（语义、信息、信息）的科学理解和解释方面都没有取得重大进展。语义、价值）信息的特异性。迄今为止，世界文献中还没有一种普遍的信息理论能够令人信服地解释信息的定量和定性特性的统一的起源和本质。

本文基于对国内外文献的分析，描述了构建一般信息论的一些原则，该理论解释了这一令人惊奇的综合物质现象的定量和定性本质——现代人类文明的基础，智力圈的形成（合理）社会。对信息自然本质的科学理解不仅对于哲学家和自然科学家来说是必要的，而且首先对于那些今天实际上为我们世界的发展奠定了基础的人来说是必要的——信息技术具有普遍的实用性、科学性、哲学和战略性格。

关键词：物质理想论、离散性与连续性的相关性、信息类别（种类）、先验、精神、灵魂、无限、波函数崩溃（退相干）、心脑问题和心身问题、信息语义、自由意志、行动结果的接受者、社会交换、一般（定量-定性）信息理论。

Abstract. *There is a secret of information in the world - not the secret of some news, some event, a mysterious incident, but the secret of the very existence*

of information in our many-sided and dynamic world: what kind of entity is this - elusive, but influential, having neither flesh nor smell, no color? How to understand and rationally designate the nature of information in comparison, for example, with a thing, with heat or cold, with movement or rest, with any material process?

Today, hundreds of scientific books and thousands of journal articles, discussion treatises by philosophers and natural scientists are published in the world, dedicated to the universal, widely used, but still poorly understood **phenomenon of information**. This need is caused by the ongoing transition of human civilization from the second to the third supercycle of development, which is characterized by the formation of an **information civilization**, the growing and more complete informatization of society, the “digitalization” of all aspects of the economic, industrial and spiritual life of people, and in the future of the XXI century - such revolutionary shifts in the very foundation of society, as a gradual replacement of the main human life systems with **artificial** ones, thanks to the rapid development of information technology and the creation on Earth of a kind of another universal civilization - a “**civilization of robots**” with artificial intelligence.

On this inevitable historical path, the lack of a generally accepted interpretation of the very nature of information that has developed by the 20s of the 21st century in world science and philosophy seems paradoxical. After the creation in the 40s of the twentieth century of the foundations of the **quantitative** theory of information (K. Shannon, N. Wiener, etc.), neither physics nor philosophy made significant progress in scientific understanding and explanation of the **qualitative** (semantic, semantic, value) specificity of information. To date, there is no **general theory of information** in the world literature that convincingly explains the genesis and essence of information in the unity of its quantitative and qualitative properties.

Based on the analysis of domestic and world literature, the article describes some principles for constructing a **general information theory** that explains the quantitative and qualitative essence of this amazing and comprehensive phenomenon of matter - the basis of modern human civilization, the formation of a noospheric (reasonable) society. A scientific understanding of the natural nature of information is necessary not only in theoretical terms for philosophers and natural scientists, but first of all for those who today practically create the basis for the development of our world - **information technologies** that have a universal practical, scientific, philosophical and strategic character.

Keywords: Theory of ideality of matter, correlation of discreteness and continuity, classes (kinds) of information, transcendental, spirit, soul, infinity, collapses of wave functions (decoherence), mind-brain problem and mind-body

problem, semantics of information, free will, acceptor of the result of action, social exchange, general (quantitative-qualitative) theory of information.

As shown in my previous studies [1], **the key idea of the theory of the ideality of matter is the idea of correlation (conjugation) of two generic intentions of the universe, namely, its focus, on the one hand, on constant division, on the formation of a hierarchy of discreteness, and on the other, on preservation of the continuity, connectivity, integrity of our universe.** This dichotomy/opposition is often unreasonably associated with the centuries-old battles between the philosophical ideas of materialism and idealism. As a counterargument, I will refer to the work “On the modern form of atomism” by the famous Russian theoretical physicist, academician M.A. Markov, a specialist in the field of quantum electrodynamics, the relativistic theory of elementary particles and non-local field theories: “the struggle between the ideas of discreteness and continuity does not at all lie in the aspect of the struggle between **idealism and materialism**. The struggle between the ideas of discreteness and continuity in physics, cleared of random moments, the change of these ideas at different historical stages is a natural contradiction in the development of views on matter, which reflects a kind of **unity** of the discontinuous and continuous, carried out in nature itself (emphasis mine. - A.L. .)” [2].

Unfortunately, the discreteness and integrity (discontinuity and continuity) of the world are still often considered **separately** by researchers. The new world outlook - the world outlook of the 21st century - requires the doctrinal unification of these two fundamental states of the universe - in a single **mega-theory**, i.e. such a scientific description of the “world as a whole”, which would be based on the relationship and interdependence of these two generic intentions of the universe. Such a seemingly simple theoretical condition actually literally blows up the old worldview.

In the twentieth century, most scientists came to a conscious understanding of the key fact that the main attributes of matter are not only “material entities” (substance, energy, physical vacuum, etc.), but also “ideal entities” (information, psyche, consciousness, spirit, etc.). At the same time, **information** that is ideal in nature (characterizing all the ideality properties of matter) reflects the **dialectics** of the world and is objectively generated as a result of a number of basic **relations** (*correlation, conjugation and/or opposition*) of at least two (or more) discrepancies of the universe. This formula goes back to the classical work of I.M. Sechenov “Elements of Thought”, published in 1887 and containing the following definition of one of the ideality phenomena most familiar to humans: “*any thought, no matter what order it may be, can be considered as a comparison of conceivable objects with each other in some respect*” [3].

It is easy to see that this definition is still limited to the sphere of thinking (consciousness) and only indirectly extends to the objective, natural world. Only at the beginning of the 20th century, after science reached the *quantum level* of the movement of matter, and then thanks to the *explication* of the *concept of information*, it became clear that I.M. Sechenov has a deeper, essentially *universal, fundamental* character. The fact is that *binaries, dichotomies, symmetries-asymmetries*, i.e. the principles of *pairing* and *opposition* (duality, conjugation) are manifested in our world in a variety of ways at all levels of the movement of matter [4], and, therefore, underlie the *basic mechanisms* for generating not only various material ones - physical, chemical, biological and social (complex) - states of matter, but also, accordingly, the various ideality phenomena accompanying them - *classes (kinds) of information* - in their codes reflecting (displaying) these actually material discreteness and all relations existing between them, including their informational connections. Prominent Russian theorists A.D. Ursul, I.M. Gurevich and others, in accordance with the well-known interpretation of N. Wiener, in their works thoroughly showed that the *essence and specificity of information really lies in the fact that it is an ideality property of matter, its third attribute, along with matter and energy*:

“Information is an objective characteristic of diversity, heterogeneity of the distribution of matter in space and time, uneven processes at all levels of movement and evolution in the universe. Reflection is the main property of information... <...Information is the diversity that one object contains about another object (in the process of their interaction)... But information can also be considered as diversity, which is, as it were, the result of the object’s reflection of itself, that is, self-reflection... Information expresses the property of matter, which is universal. After all, both diversity and reflection are universal properties, attributes of matter” [5].

It is easy to understand that any “diversity”, “heterogeneity”, “unevenness” are infinite and are reflected only through the *correlation* of certain *pairs of discreteness*, and it is these ratios at all levels of the movement of matter, in turn, that *generate* the corresponding *classes (kinds) of information (phenomena of quantum decoherence, chemical affinity, phenomena of spiritual, mental, consciousness)*. Self-reflection is the initial, elementary information of the most specific discreteness. From this it follows that a scientific (informational) description of the Universe is possible only by revealing in it the results of the *correlation* of certain pairs (or sets) of discreteness, i.e., speaking in philosophical language, by revealing in nature the laws and forms of *dialectics* immanently inherent in it.

In the world there is both the familiar to our mind, the *finite (non-extended)*, *and the infinite (extended)*; *and* divided *and* connected; *both* individual *and* collective; both discrete and holistic. Usually we perceive these oppositions as a

trivial given, but, unfortunately, the logical operator of conjunction (“and”) involuntarily *camouflages* the results of the relations that arise between these two fundamental intentions, not allowing us to reveal the main thing - the “*third*” that *arises as a result of the interactions* of these two initial intentions of the universe. Meanwhile, the “third” that is generated in this case is not only something new, sensually perceived material, but also the non-sensory accompanying it, actually “ideal” - the second kind of essences of substance, inaccessible to our material senses, but perceived by our **transcendental mind**.

Fundamental and intimate (and, above all, inaccessible directly to our senses, i.e. *transcendental*) is easily hidden behind a very simple and everyday. Buddhists illustrate this point by clapping with two palms. Is it possible to clap with one hand? The answer is, of course, obvious. And the point here is not in the nature of cotton itself. In fact, many phenomena need *pairing*. Our world is naturally *binary*, this follows from its “mirror” (symmetry), which does not mean the complete identity of partners. After all, two palms capable of producing cotton are obviously different from each other, and at the same time from all other pairs of palms. But these are only the beginnings of opposites on which our world is based.

However, it is not so difficult to understand that any two hands (or, say, two stones) are different from each other. It is much more difficult to understand what it is - *pairing* (i.e., the opposite as such, or mirroring, or, in scientific terms, the chirality of left and right), to understand that this pairing (*chirality*) in itself inevitably gives rise to something the **third** - and not just another material phenomenon (the same sound of cotton), but something significantly different, signal, meaningful and at the same time significant, informational, denoting a certain internal connection of partners with each other, qualitatively different from a power, energy connection, but, undoubtedly existing and essential, revealed by their own material, force, energy interaction.

The main thing here, of course, is not the physical movement of the palms, and not even the sound they produce, but what it means, i.e. its **meaning and significance** and, consequently, the **world-forming semantic meaning** of the emerging cotton, i.e. objectively existing, but something no longer purely material, but unmanifested, transcendental, spiritual. At this point, nature reveals its hidden essence, enters a new level of its existence, fixing the fundamental connection of **binary-trinity** due to the emergence of another, already deeper and freer pairing - the complete opposite between material sound and its incorporeal *ideal meaning*.

The ideality of matter can be understood on the basis of a simple *act of division*: if a certain discreteness A is divided, for example, in two: into A1 and A2, then even with the obvious conservation of matter, nevertheless, something qualitatively new, something “third” is formed in this elementary material process. and at the same time intangible, designated by us with indices “₁” and “₂”. This

“additive” is its ideality property revealed in the process of matter movement, perceived by our abstract mind as ideal information about the occurred material act of division. A certain integrity was divided, giving rise to new structures and, consequently, new meanings (meanings).

Thus, naturally and naturally, the material “releases” **the ideality, the spiritual, i.e. information**, which, in turn, already loudly declares its legal rights to **actively participate** in the construction of the world - even if we, the people, are deaf and blind, and none of us can hear this policy statement of her about the new constructive force revealed in this - the **ideality of matter**.

It is curious that Western philosophers and natural scientists who study consciousness, the psyche, thinking, the phenomenon of life, often do not even realize that they are studying nothing but *ideal entities*. At the same time, it is characteristic that “in Western philosophy, starting from the middle of the twentieth century, a powerful materialistic movement arose, represented by dozens of leading thinkers (H. Feigl, W. Sellars, J. Smart, W. Place, D. Armstrong, T. Nagel, A. Quinon, D. Davidson, T. Wilkerson, J. Fodor, H. Putnam, A. Danto, Ed. Wilson and others. P. Feyerabend and R. Rorty contributed to the substantiation of the extreme versions of reductionist materialism in their time). It was associated with the disintegration of logical positivism, the rehabilitation of ontological and “metaphysical” problems; the central point of discussion was the question of the relationship between “mental and physical”, “spiritual and bodily”, “consciousness and brain” (which in the language of Russian philosophers approximately sounds like the ratio of “ideality and material”). This post-positivist movement gave rise to such areas as “scientific materialism”, “functional materialism”, “emergent materialism” and a very weak opposition to them of a dualistic nature (K. Popper, J. Eccles, E. Polten) ...

A serious development of the problem of the ideality (we will still use “our” term - “*ideality*”) is unthinkable at the present level without taking into account the experience and results of studying this issue within the framework of analytical philosophy, those sections of the Western methodology of science whose interests are concentrated on the relationship between “spiritual and bodily” (more accurately in English this is referred to as mind-brain problem and mind-body problem). Of course, such a development should be based at the same time on the latest achievements of science, primarily psychology, neurophysiology, and especially those areas of knowledge that are subject to information processes, computer technology, cybernetic devices, and theoretical issues of the functioning of self-organizing systems” [6].

To this fair remark of the Russian philosopher, we must also add that, despite the flood of Western (primarily English-language) works on this issue, our Western colleagues do not notice any cardinal progress in this area, as convincingly

evidenced, for example, by the book American professor John Searle “Rediscovering consciousness” [7], in which the author shows that in the West the theory of consciousness (and, consequently, the theory of the ideal, spiritual) initially went in the wrong direction and actually dissolved in fruitless scholastic disputes. Searle formulates his main methodological goal almost messianically: “I want to hammer the last nail into the coffin of the theory according to which consciousness is a computer program” [8].

Searle rightly proposes to recognize that “the real world, that is, the natural world described by physics, chemistry and biology, contains an irreducible subjective element” [9]. But he lacks the courage of the spirit to recognize the really key fact of the “real world”, namely, that the “non-eliminable subjective element” is nothing but an **attribute**, i.e. the **creation** of objectively existing **matter**, thanks to (I will add from myself) the presence of two interconnected and interdependent intentions in it - on the one hand, its aspiration to constant division (discretization), and on the other hand, to the preservation, ultimately, of its immanent integrity.

Among the “damned questions” of philosophy, the focus has always been on the one that German philosophers of the 19th century aphoristically formulated: “The “spirit” is cursed from the very beginning - to be “weighted down” by matter ...” [10]. Here is the beginning of that dividing line which, after all, conceptually separated the philosophical teachings of materialism from the philosophical teachings of idealism; and this constantly complicates the search for truth. But, first of all, we should not forget **that it is matter that gives rise to the spirit, and not vice versa, and also that the spirit never exists in isolation from the material womb that gave birth to it** (despite the beautiful tales about the afterlife vale of the spirit, which inspire believers with their church guides).

Of course, the presence of the spirit in the body (or let’s say in general: information in matter) ennobles the flesh in a certain way, and for the human body, the very presence of the spirit in it means, perhaps, the main value - the actual **life** of this body, no matter what invaluable accomplishments can be achieved by this body, or, on the contrary, how mediocre and empty, in the end, will be its existence. In this sense, the spirit seems to have a certain advantage over the body - if only because, we are told, that the spirit is immortal and the body is mortal. True, the mortality of the body is obvious, but the immortality of the spirit remains a scientific hypothesis or one of the sacred creeds.

For a true naturalist, it is obvious that the emergence and existence and, finally, the disappearance of a particular spirit is always associated with the emergence (birth), existence (life) and disappearance (death, decay) of a particular body. **There is no specific body, and there is no specific spirit.** From which follows a completely logical assumption that it is the emerging body that gives rise to the spirit (and not vice versa). And it is from this act of birth that the “curse” of the

spirit begins. Such a curse can be understood as a maternal umbilical cord or, if you like, as heavy life chains that the body (matter) imposes on the freedom-loving spirit, not allowing it to break away from the original flesh, which, however, is justified to a certain extent, because, as we have seen higher, without a body, the spirit has no real possibility to exist and manifest itself in our earthly world.

The foregoing is enough to admit that we know little about what it is - the *spirit* (as, however, our understanding of the essence of **matter** is also limited). It is significant that in ancient Greece the concept of spirit (nous, pneuma, etc.) was originally conceived as the thinnest substrate with some signs of matter. For modern natural scientists, the spirit is generally an epiphenomenon, while philosophers from time immemorial have been trying to find a common basis for defining the concept of spirit. So, in Plato and Aristotle, nous (mind, spirit) becomes a fundamental concept: for them it is the formative principle and prime mover of the cosmos (Aristotle calls the spirit entelechy, or the form of reality, in contrast to the second term of his philosophy - energy, meaning the transition from possibility to reality).

The well-known (and in many respects justified) *identification of the spirit with the soul* is added to this dynamic (although, apparently, the Indian philosophical doctrine of *metempsychosis*, the transmigration of souls, does not quite fit into such an identity). In the philosophy of modern times, a rationalistic understanding of the spirit has become widespread - first of all, as reason, thinking (R. Descartes, B. Spinoza, French materialists of the 18th century).

One of the difficulties of the general information theory is that the *phenomenon of the ideality (the ideality of matter)* has many names (which, unfortunately, other researchers of this phenomenon do not guess); and in this extensive nomination it is necessary, first of all, to single out the two most general and, in my opinion, equivalent categories denoting the “ideal”, namely: **spirit and information**. It is known that the concept of “spirit” has been used in different ways in philosophy for thousands of years, while the concept of “information” was introduced into science for the first time only in the twentieth century. In the first part of my research [1], I already had the opportunity to state that the explication of the scientific concept of “information” was, in essence, the justification of the concept of “spirit” - sacred in religions and subject to various fantasies and mystifications in esoteric teachings.

So spirit is the **ideality** of the ideal. Such an explication removes many epistemological problems. From now on, nothing prevents us from perceiving the phenomenon of the spirit quite neutrally, as one of the basic categories - both philosophy and science - for describing the world as a whole, namely for the knowledge of all *ideality phenomena existing in the world, i.e. the second kind of properties of substance (matter)*. However, such an approach already exists. So, Henri Berg-

son directly pointed out one of the possible identities in this sense: “Whoever says “spirit”, he, first of all, means consciousness” [11]. And then he clarified: “... consciousness, first of all, means memory”; At the same time, “any consciousness” is not just a memory, but “the preservation and accumulation of the past in the present”, as well as “and anticipation of the future”. It is clear that in “preservation, accumulation and anticipation” we are talking about information. Thus, Bergson builds a chain of concepts: spirit - consciousness - memory - information. But such and similar chains of concepts, describing ideality phenomena and originating in the category of spirit, can be built in great numbers.

So what is spirit anyway? In the very first approximation, this is nothing but an ideality property of matter, namely one of the two (along with materiality) fundamental, generic properties of a substance. To begin with, this brief definition of such a complex and diverse phenomenon can be limited; the essence of the spirit can be revealed only as we consider its modifications at different levels of the motion of matter.

Emancipated through modifications of matter, the ideal *spirit*, however, can never completely break its ties with material substrates; in its essence, it specifically *characterizes the stages of the evolution of matter*, representing the *degree of development* (or in the literal sense of spiritualization) of our world, revealing the true semantics of information in science and creativity and, in general, providing the **noospheric** development of human civilization, in which it finds its own a grateful promoter, and your desired target.

The ideality in science is traditionally (and, in general, not without reason) identified with consciousness, because it is in the **awareness** of the world, and the self-conscious, and the very ability to be aware (the ideal doubling of the world) that a person sees the main miracle of the universe. At the same time, there is a lot of direct and indirect evidence that the usual linear understanding of the development of the Universe - as an ascent from inorganic forms, processes and properties to social and conscious ones - is **oversimplified**. It stems from the descriptive nature of consciousness itself, which strives to find rational meaning, disjunctivity, and certainty in everything. In reality, the world is relative, non-linear and non-equilibrium. Simultaneously and in parallel with the general intention of matter towards consciousness (i.e., along with reflection, reflection, awareness), other manifestations of the ideality of matter have always existed and exist in the world - and among them are, for example, such irrational entities as empathy and love of discreteness of each other. to a friend, the manifestations of which are already seen in attraction and repulsion in inorganic matter, in affinity in elementary chemistry, and, even more so, in the constructive phenomenon of collectivity in biology and society.

Perhaps there are simple and intelligible physical-chemical and biological mechanisms behind the all-consuming love flash; and we, unfortunately, will someday comprehend them, which will open up the possibility for manipulating the innermost in man, for such is the nature of the ideal spirit: he wants to be omnipotent, and he is theoretically capable of this, since there is an **infinite and unlimited multiplication of the ideality of matter in the world: the ideality of ideality is a new ideality – and so on, ad infinitum**. This elusiveness and omnipresence of ideality is perceived as what we intuitively designate as an ideal spirit (the omnipresent “holy spirit” or universal “secular spirituality”), but in fact - in the form of a certain universal ideal connecting essence - the **semantics of information**.

It is characteristic that more than half a century later, thanks to the achievements of quantum mechanics, physicists already saw in the trivial collapses of wave functions the origins of sacramental “**free will**”, based on the stratification of physical systems into informational (ideal) and dynamic (material) subsystems, however, not yet daring to call this process the real genesis of the spirit.

So, according to the Russian theoretical physicist, an outstanding scientist in the field of plasma physics and controlled thermonuclear fusion B.B. Kadomtsev, “for the informational behavior of complex physical systems, the structural complexity and structural hierarchy are more important, and not the hierarchy of elementary levels (particles, atoms, molecules, bodies) (i.e., the property of the ideality of matter expressed in the structure, and not its material-energy materiality as such - A.L.). Elements of information behavior appear even in microparticles in the form of collapses of wave functions, and as structures become larger and more complex (i.e., as **information** accumulates in their memory. - A.L.), non-equilibrium collective order parameters are added to them, playing the role of dynamic variables. Wave function collapses and bifurcations of dynamic variables near branch points look like free actions, i.e. as a manifestation of free will (highlighted by me. - A.L.). Thanks to this, Nature as a whole has the possibility of free development, which is realized in the structural complication and development of its constituent elements – complex physical systems...” [12].

But if Kadomtsev’s concept shows how matter at the quantum level “liberates” the spirit (more precisely, how it generates information that is ideality in its essence due to decoherences - collapses of wave functions - when microparticles collide with macrobodies), then it still does not give an answer to the question is how spirit (information), in turn, affects matter. Is the “**matured**” **ideality - consciousness** - the only chance for such an impact?

By the way, how do macrobodies differ from microparticles, of which they, in fact, consist? What exactly makes macro-objects micro-objects, i.e. what are the grounds for the “transition” from microparticles to macrobodies? What is the

essence of **diversity**? And doesn't it introduce some new, apparently **systemic quality** into the interactions of the micro- and macrocosms?

Alas, the "intimate" side of the impact of thought on the brain still remains a longed-for gap in science.

Perhaps the explanation of such a universal mechanism lies in the **specialization** of material discreteness. For example, what is it - "**acceptor of the results of action**" P.K. Anokhin (whose roots are already found in the "conditioned reflexes" of I. Pavlov and the "dominant" of A.A. Ukhtomsky)? This is a specialized locality of the brain body that operates with "ascending" afferent information and, in turn, is capable of influencing the actual material organs and processes of the body with its "descending" efferent impulses (excitations). The action result acceptor is a very complex apparatus, very fast and very accurate [13]. At the same time, it is obvious that the acceptor of the results of the action of the brain is **dual** in nature: "on one side" it is turned to the spirit, on the other - to the flesh. These ideas are being developed today by the grandson of an outstanding physiologist, K.V. Anokhin, who interprets the mind as a network of "**cognitoms**".

How is it possible in general for the emergence of such mechanisms of interaction between matter and the information generated by it (materiality and ideality)? Perhaps the whole point is that stationary irreversible material systems (arising and existing already at an early stage of discretization, "division" of the universe) through specialization discovered the possibility of "retreating to their original positions" - the formation of temporary **reversible structures**? Apparently, this mechanism resembles (or, more precisely, includes) such exotic processes as **superconductivity, superfluidity**, and especially **tunneling** at speeds exceeding the speed of light, as well as **nonlocality and long-range action**. Is it not in these processes that the answer to the question of scientific understanding of the phenomenon of **telepathy**, which has long intrigued the attention of researchers, is hidden?

But another way of interaction between material structures and information (materiality and ideality) is also possible; it is created by already "self-conscious matter"; it is a **social exchange**, which turns out to be possible by separating such an ideality phenomenon from material discreteness as **value (significance, cost)**. Alchemists, who, due to the underdevelopment of science, could not turn, for example, lead into gold, could well do this by applying the act of barter, with the help of a universal **equivalent - the commodity** of commodities - money. And this social "transformation" is quite real, although in a certain sense it has an ideal, symbolic character. Note that the **process of exchange**, despite its value (ideal) foundations, has a material nature, because real bodily entities participate in it, but in social interaction their interchangeability is determined not only and not so much by their material properties, but by an ideality and socially useful concept

by their nature, **information** - their **value (value, significance) formulated by the mind.**

I have written (but not yet published) the monograph “Treatise on Information”, in which the main postulates of the **general (quantitative-qualitative) theory of information** are considered and formulated in detail.

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肿瘤疾病医学和药物预防筛查的相关性

**THE RELEVANCE OF SCREENING FOR MEDICAL AND
PHARMACEUTICAL PREVENTION OF ONCOLOGICAL
DISEASES**

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注解。 组织专业医疗和药学护理的现代方法对于疾病的治疗和预防非常重要。 在现代条件下, 疾病发生前的预防措施、医疗组织活动中筛查的创建和引入对于预防计划的制定变得非常重要。 目前, 专业药学服务系统中药物预防计划的发展极为重要。 卫生保健的主要战略方向是预防性的, 实现社会政策和公共卫生战略的进步思想和原则。 强调预防措施, 防治最常见的疾病, 其中在全国范围内实施卫生流行病学、卫生和其他医疗和医疗技术预防措施至关重要。

关键词: 药物预防、外部环境、癌症、专业药学服务、筛查、危险因素。

Annotation. *Modern approaches to the organisation of specialised medical and pharmaceutical care are important in the treatment and prevention of diseases. In modern conditions, preventive measures in the state of pre-disease, creation and introduction of screening in the activities of medical organizations becomes important for the development of preventive programmes. The development of pharmacoprophylactic programmes in the system of specialised pharmaceutical care is currently extremely relevant. The main and strategic direction of health care is preventive, realising progressive ideas and principles of social policy and public health strategy. Emphasis on preventive measures in the fight against the most common diseases, where sanitary-epidemiological, hygienic and other medical and medico-technical preventive measures carried out on a nationwide scale are of paramount importance.*

Keywords: *pharmacoprophylaxis, external environment, cancer, specialised pharmaceutical care, screening, risk factors.*

Purpose: to familiarise medical and pharmaceutical specialists with the significance of screening of cancer risk factors in order to implement preventive measures among the population.

Materials and methods: in the study of risk factors of oncological diseases, the following methods were used: marketing, sociological, content analysis.

Results and discussion. In oncological diseases the main goal of specialised pharmaceutical care is to cure the patient. The organisation of specialised pharmaceutical care for patients with oncological diseases includes the formation of a balanced drug policy. Early prevention of oncological diseases and treatment in the pre-disease state is important [2,9,13,14].

We analyse the data of state medical statistics for 2020. In 2020, 556036 cases of malignant neoplasms were detected in the Russian Federation (including 256069 and 299967 in male and female patients, respectively). The decrease in this indicator compared to 2019 was 13.2%. At the end of 2020, 3973295 patients were registered in territorial oncological institutions of Russia (2019 - 3928338). The cumulative prevalence rate was 2,712.9 per 100,000 population. The diagnosis of malignant neoplasm was confirmed morphologically in 94.4% of cases (2010 - 85.3%). It should be emphasised that compared to 2016 in Kuzbass in 2020 there is a decrease in the incidence of malignant neoplasms by 7 % [2,4].

It has been established that every year the frequency of cancer diagnoses increases. This is attributed both to the improvement of diagnostic methods and the influence of factors that provoke such diseases.

On average, 10,000,000 people in the world fall ill per year, 28,089 people per day, of which 1,600 are Russians. And we are talking only about those who have been diagnosed [2,4].

It should be emphasised that the principles of social health policy have required a new strategy based on prevention, which needs both strengthening and adjustments.

It has been revealed that skin tumours rank first in the structure of cancer diseases in Russia. The skin suffers first, as it is in the path of ultraviolet light and other harmful environmental factors [2,4].

In second place is breast sarcoma in women. Breast tumours are the most frequent oncopathology among the female population. This is attributed to the sensitivity of the mammary glands to the effects of estrogen. The risk of breast cancer increases with age [2,4].

Young women are less likely to get GI cancers because they watch their diet, unlike men who also drink more alcohol. However, the female half of the population is more prone to skin cancer due to sunbathing without sunscreen.

Bronchial oncological diseases are more common among men in Russia. This is primarily due to smoking, and only secondarily due to unfavourable ecology. Poor nutrition and alcohol are prerequisites for cancer of the digestive system in the male part of the population.

Over the past 10 years, the number of cancer patients in Russia has increased by almost 23%. This is due not only to the growing incidence of the disease, but also to the greater availability of diagnostics.

In 2020, the number of patients with primary detected cancer in Russia decreased - for the first time since the beginning of the XXI century. But already at the beginning of 2021, this figure rose again, with patients seeking help at later stages. This means that in 2020, people were simply wary of being diagnosed because of the risk of getting the coronavirus. Cancer statistics differ between men and women. The former are more likely to get prostate cancer, while the latter are more likely to get breast cancer [2,4].

The list of world leaders among cancer diseases in terms of mortality is as follows: the most life-threatening cancer is lung cancer (1.8 million deaths), half the rate of colon and rectal cancer, 830 thousand people died from liver cancer last year, 769 thousand from stomach cancer and 685 thousand from breast cancer. According to statistics, cancer patients are saved first of all by timely diagnosis. 90% of patients whose cancer is detected at an early stage are successfully cured and live for many years in remission [2,4,16,17].

Oncoscreening is of great importance, i.e. diagnosis for cancer. Thanks to the preventive measures taken by the state, including those specified in the order of the Ministry of Health, it is possible to undergo free oncology screening under the MHI. If a person is over 40 - once a year, if younger - in the years when the number of full years of your age is divided by 3 without remainder [5].

It has been found that the likelihood of cancer depends on many factors, including age, lifestyle, environmental quality and genetic predisposition. It is necessary to undergo cancer screening in the following cases: when you reach the age of high risk of getting one of the common types of cancer, if you have relatives who have had cancer - in this case, the first screening is recommended to be done 10 years earlier than the age at which the cancer disease was detected in a loved one, if there are characteristic signs of cancer: subfebrile temperature, weakness, sudden weight loss, fatigue, pain, as well as other atypical symptoms (for example, colon cancer can manifest itself in stool problems, breast cancer).

The most common types of cancer today are breast cancer, lung cancer, colorectal cancer, prostate cancer, skin cancer and stomach cancer. Lung cancer is statistically the most life-threatening cancer [2,4].

Factors that reduce the risk of getting cancer are known worldwide. First of all, it is a healthy lifestyle: quality sleep, eating fruit and vegetables, avoiding alcohol and tobacco, as well as regular exercise and walking in the fresh air [10,11,12].

The best way to reduce the chance of dying from cancer is to detect it early and start treating it. For the most common types of cancer, types of screening have already been developed and proven to be effective.

Screening is recommended every three years for people under 39 and annually for those over 40. A balance between the risk of missing cancer and the side effects of the diagnosis itself is important. Regular screenings are therefore indicated for people at risk [7,8].

It should be emphasised that the first duty of medicine is to keep healthy people healthy, the second is to treat diseases.

In modern conditions, improving the content of pharmacoprophylactic programmes, as a way to optimise pharmaceutical care, is the most important task of screening and contributes to the identification and evaluation of health reserves.

Pharmaceutical prophylaxis as a medical technology is a system of interrelated, minimally necessary but sufficient pharmaceutical interventions, the purpose, time, place and volume of which are scientifically justified, and the performance of which allows the most rational way to ensure the achievement of maximum compliance with the expected results of health preservation and promotion [6,7,8,15].

Many countries have introduced and continue to introduce various health screening programmes in population groups, but at the same time there is a process of abandoning screening for certain diseases. In Russia, some elements of screening are present within the framework of national programmes for the identification of risk factors and prevention of chronic non-communicable diseases, including cancer.

In 1968, the World Health Organisation published a monograph by Wilson and Jungner, which outlined the principles of screening [16,17].

By screening (from the English screening - screening, selection, sifting) J.M.G. Wilson and G. Jungner meant "the detection of cancer patients. Jungner meant "detecting among the apparently healthy population those individuals who actually suffer from certain diseases" [16,17].

In the Russian-language version of this publication in 1968, the term "screening" was not used, but was translated as "examination". Despite the obviousness and simplicity of the approaches outlined by J.M.G. Wilson and G. Jungner, in the following decades, society and physicians faced a number of problems in the choice of diseases to be screened, screening methods, organisation and evaluation of the effectiveness of screening programmes [16,17].

Screening is carried out in many countries around the world, but there is still no unified definition of screening and no unified screening programmes, especially for cancer.

Screening is the process of identifying, in apparently healthy individuals, high-risk factors for a disease or a disease that is not yet clinically apparent. Individuals

screened are provided with information about the test results and, if necessary, offered further screening and appropriate treatment to reduce the risk of disease and any complications associated with the disease [1,16,17].

Screening is a methodological approach used, particularly in medicine, for mass screening of the population to identify a particular disease or factors contributing to the development of that disease [1,16,17].

In the Order of the Ministry of Health of the Russian Federation No. 869n dated 26.10.2017 "On Approval of the Procedure for the Dispensary Examination of Certain Groups of the Adult Population", the term "screening" is used as a synonym for the first stage of dispensary examination [5].

Advantages of screening: theoretically, early detection and less traumatic treatment at an early stage of the disease will allow to cure and/or prevent the development of complications of the disease, increase life expectancy. Disadvantages of screening: longer period of awareness of the disease by the person, risk of direct harm to health by some screening tests, significant expenditure of resources of the health care system [5].

To screen for a risk factor, there must be reliable evidence that simple, inexpensive, valid, sensitive and specific tests are available to detect the early stage of a disease/risk factor. A test that detects disease only when symptoms of disease appear cannot be useful for screening, as the point of screening is to identify people who do not have symptoms of disease.

Few interventions aimed at early detection of cancer fully meet the requirements of screening programmes. Overall, organising screening is a complex and costly process. Personalised electronic registration and storage of results in a database must be ensured. The cost of case detection should be economically balanced with the possible costs of medical and pharmaceutical care in general.

Conclusion. The most significant issue of this problem is the definition of persons in a premorbid or pre-disease state, when there are no obvious clinically pronounced symptoms of disease. Some specialists consider such a state to be a disease, while others consider it to be still healthy. Meanwhile, the number of these people is indefinitely large. They are not singled out or counted in any statistics, and they represent the main pool of people for prevention. It is this group that should be the object of screening for early pharmacoprophylactic and therapeutic action.

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鼻内剂型药物开发研究的项目规划

**PROJECT PLANNING FOR A STUDY OF PHARMACEUTICAL
DEVELOPMENT OF AN INTRANASAL DOSAGE FORM**

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抽象的。考虑到医药市场的发展水平和速度,在对整个行业进行细分的同时实现生产多元化的愿望,建立一个能够在有限的时间内开发出满足特定要求的有竞争力的产品的体系是一个重要方面。区域。然而,特别值得注意的是药物开发作为决定药品质量的基本要素的作用。通过定义包括质量和安全目标以及风险管理策略的目标产品概况,可以创建一种独特的方法,旨在使用最佳资源量实现为开发人员设定的目标。

将化合物靶向递送至大脑是一个重要问题,无论从基础科学的角度还是从医学应用的角度来看,这都是根本性的。这一问题尚未解决,极大地限制了现代脑病理诊断和治疗方法的发展。目前,研究人员对鼻内给药多种药物的方法非常感兴趣。鼻腔给药被认为是口服给药的相关替代方案,因为鼻腔易于进入、血管丰富、渗透性好、表面积大,有助于良好的吸收和增加生物利用度。然而,在鼻内递送活性物质时,需要考虑剂型的配方和生物制药因素以及人体生理学之间的相互作用。

关键词: 研究计划、药物开发、药物。

Abstract. *Given the level and pace of development of the pharmaceutical market, the desire to diversify production while segmenting the industry as a whole, building a system that allows developing a competitive product that meets the specified requirements in a limited time frame is an important aspect in this area. However, it is worth noting especially the role of pharmaceutical development as a fundamental element that determines the quality of a medicinal product. By defining a target product profile that includes both quality and safety targets and a risk management strategy, it is possible to create a unique methodology aimed at achieving the goals set for developers using the optimal amount of resources.*

Targeted delivery of compounds to the brain is an important problem, which is fundamental both from the point of view of fundamental science and from the point of view of application in medicine. The unresolved nature of this problem significantly limits the development of modern approaches to the diagnosis and treatment of cerebral pathologies. Currently, the intranasal method of administering a number of drugs is of great interest to researchers. Nasal drug delivery is considered as a relevant alternative to oral administration, since the nasal cavity is easily accessible, richly vascularized, well permeable, has a large surface area, which contributes to good absorption and increased bioavailability. However, when delivering active substances intranasally, it is necessary to take into account the interaction between the formulation and biopharmaceutical factors of the dosage form and the physiology of the human body.

Keywords: *study planning, pharmaceutical development, drug.*

In the course of determining the space for the pharmaceutical development of a medicinal product (MP), a decision area was created that allows separating the type of work under consideration from operational activities in order to achieve the set goals within the regulated time frame. The approach presented in this article to the analysis and implementation of processes, both the development and the life cycle of a pharmaceutical product as a whole, is distinguished by a great depth of stakeholder involvement and effectiveness. Based on the study, the output data for the study planning was formed: the design of the project, which contains, among other things, the updated terms of reference for the development, schedule and budget. The calendar plan describes in detail the sequence of subtasks necessary to achieve the final goals, with the distribution of resources, the percentage of their utilization and timing.

When creating a drug for intranasal use, it is necessary to adhere to a structured pharmaceutical development plan that combines the physiological properties of the body and the biopharmaceutical parameters of the dosage form (DF), which will contribute to the creation of high-quality drugs and open up new opportunities for the treatment of various diseases.

Pharmaceutical drug development is a step-by-step sequential process, which consists in studying the necessary physical and chemical properties of an active pharmaceutical ingredient (API), developing a model system for the surface of the nasal epithelium in vitro, developing a method for releasing the active substance in vitro, evaluating the compatibility of components, studying quality indicators that meet the quality of the dosage form, as well as the evaluation of stability.

The direction of choice of excipients in the development DF for nasal use is due to the following factors:

- properties of the introduced substance in the DF;

- physical and chemical parameters of the nasal mucosa and nasal secretions;
- physical, chemical and technological properties of excipients.

In addition to the physicochemical properties of the substance, such as solubility, molecular weight, lipophilicity, pKa, etc., absorption through the nasal mucosa is influenced by the properties of the nasal cavity. Due to the limited volume, only small doses (1-200 μ l) can be used [5, 7]. Moreover, the respiratory epithelium of the nose is composed of columnar cells covered with cilia, which move in a coordinated manner to move mucus from the surface of the epithelium towards the pharynx.

This physiological phenomenon in the structure of the mucociliary clearance of the nasal epithelium dictates the need for multilevel experimental studies of both physicochemical and biopharmaceutical profiles for the development of intranasal DF [4].

Figure 1 presents the study plan for the pharmaceutical development of an intranasal drug.

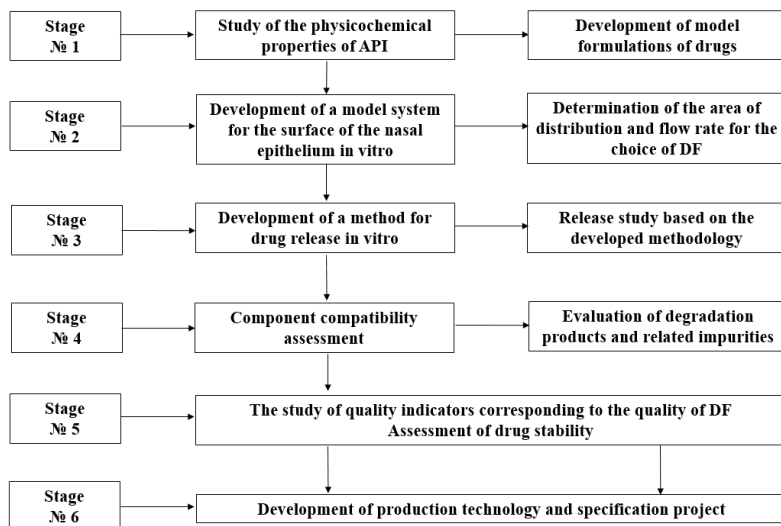


Figure 1. *Pharmaceutical Development Study Plan for Intranasal dosage form*

The nasal mucosa is covered with pseudostratified epithelium, consisting of ciliated, goblet, as well as short and long intercalated epithelial cells. The ciliated cell has numerous cilia at its free end. Ciliated cells have 250–300 cilia each, 7 microns long and 0.3 microns high. Each cilium consists of 9 pairs of microtubules

arranged in a ring and surrounding two unpaired central microtubules. The movement of the cilia of the ciliated epithelium of the nasal mucosa is carried out by sliding microtubules. The movement of cilia is strictly directed from the vestibule of the nasal cavity towards the nasopharynx. However, in the lowest parts of the nose, at the anterior ends of the inferior turbinates, the current of mucus is directed from the outside. The frequency of the beating of the cilia is 10-15 strokes per minute. A particle that has fallen on the surface of the mucosa travels from the anterior parts of the nose to the nasopharynx in 5-20 minutes [7].

Mucociliary clearance is provided by nasal secretion. The nasal secretion consists of two layers: a less viscous perianal liquid with sol properties (7-10 μm thick) and a more viscous superficial layer with gel properties (0.5-2 μm thick). The source of the secret covering the epithelium of the nasal cavity is the mucous glands of the nasal mucosa, goblet cells, extravasation from subepithelial capillaries, lacrimal glands, the secret of specialized Bowman's glands from the olfactory zone of the nose [5]. The total amount of excreted secret for bitches ranges from 0.1 to 1-2 liters. Most of the released secret is spent on moistening the inhaled air, the rest is moistening the mucous membrane. The mucosal secret normally consists of 95% water, the remaining ingredients of the secret are proteins, mucoglycoproteins, nucleic acids, phospholipids. The pH value of the nasal secretion is normally 7.4 ± 0.3 (when measured outside the nasal cavity), and directly in the nasal cavity, according to various authors, varies in the range of 4.6-6.5. The viscosity of the nasal secretion is, on average, 1.17 ± 0.1 , and it is due to the presence of mucoglycoproteins and sugars (80% of dry matter) in the composition. Mucoglycoproteins form a significant amount of disulfide bridges, hydrogen and ionic bonds. High-molecular mucus molecules form an ordered structure of mucus and its physical properties: viscosity and elasticity [6].

To overcome the short residence time of drugs in the nasal cavity as a result of mucociliary clearance, various mucoadhesive excipients (for example, chitosans, gectins, thiomers, poloxamer, or sodium hyaluronate) and polymer compositions should be added to the dosage form to increase contact time with the nasal mucosa, thereby increasing the likelihood of absorption of the substance [2, 3].

Conclusions

Despite the presence of risks and limitations in any project, the considered approach offers a wide scope for process variations while being simultaneously determined in terms of resource costs. The above allows the manager to plan and execute multiple projects in the same time area without creating bottlenecks. At the same time, the members of the project team are aware of their position and purpose, a clear determination of the output data does not imply ambiguous interpretations and implies the receipt of a result, which gives additional motivation to the staff and makes the work efficient.

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学龄前儿童急性肾衰竭无尿期收缩压昼夜节律

CIRCADIAN RHYTHM OF SYSTOLIC BLOOD PRESSURE IN THE PHASE OF ANURIA OF ACUTE RENAL FAILURE IN PRESCHOOL CHILDREN

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抽象的。研究了16例学龄前无尿期急性肾衰竭（ARF）患者舒张压（DBP）的每小时监测数据。第一天，所有受试者的昼夜节律中值 DBP 相对于正常年龄增加 16-20 mm Hg。在第 3 组（不良结果）中，在整个观察过程中，昼夜节律中值相对于正常值持续增加 23-25 mm Hg。在上午 8、15、19、23、1 点，第 3 组儿童的观察期平均 DBP 指标相对于第 1 组的指标显着超出。第 3 组儿童的 DBP 昼夜节律幅度在第 20 天后相对较低，表明血管系统出现无反应状态，这显然代表了最严重重组的死亡发生的多种机制之一。孩子们。

关键词：昼夜节律，舒张压，急性肾功能衰竭，儿童。

Abstract. *The data of hourly monitoring of diastolic blood pressure (DBP) of 16 preschool age patients with acute renal failure (ARF) in the anuric phase were studied. On the first day, the mesor of the circadian rhythm DBP was increased by 16-20 mm Hg relative to the age norm in all subjects. In group 3 (unfavorable outcome), throughout the observation, the circadian rhythm mesor was consistently increased by 23-25 mm Hg relative to the norm. A significant excess of the average DBP indicator for the observation period in children of group 3 relative to the indicator in group 1 was revealed at 8, 15, 19, 23, 1 am. Relatively lower values*

of the amplitude of the circadian rhythm of DBP in children of group 3 after the 20th day indicate the development of an unresponsive state of the vascular system, which, apparently, represents one of many mechanisms of thanatogenesis in the most severe group of children.

Keywords: *circadian rhythm, diastolic blood pressure, acute renal failure, children.*

Relevance. An increase in blood pressure that occurs against the background of pathologies of the heart, kidneys or disorders of the endocrine system, as a result of damage to the heart and disorders of the nervous system, is usually called secondary hypertension. Children often suffer from similar pathologies, as a result of which they experience both abrupt and constant increases in blood pressure. Such hypertension can be registered from the neonatal period and disappears only after the elimination of the trigger factor - the true cause that leads to vascular spasms and increased systemic pressure. However, in the literature there is insufficient information on the characteristics of the diastolic blood pressure (DBP) response during the anuric phase in acute renal failure (ARF), which developed against the background of an acute bacterial infection in children aged 3.1 to 7 years [1-5].

Goal of the work. To study and give a comparative assessment of the reaction of diastolic blood pressure in acute renal failure in the phase of anuria in pre-preschool age, which developed against the background of an acute infection.

Material and research methods. Indications for dialysis (renal replacement therapy (RRT)) were: anuria for more than 24 hours with a progressively worsening condition of the patient; increase in urea level more than 20 mmol/l. Data from hourly monitoring of body temperature were studied in 16 children with acute renal failure admitted to the ICU of the Russian Research Center for Emergency Medicine with anuria from 1 to 3 days at the age of 3.1 to 7 years. Before admission to the clinic, all patients received anti-inflammatory therapy aimed at treating pneumonia, acute respiratory infections, acute respiratory infections. Due to severe progressive respiratory failure, patients were provided with invasive mechanical respiratory support on the first day as indicated. All patients underwent hemodialysis, under the control of hemodynamics, acid-base balance, respiratory system, supportive, antibacterial, anti-inflammatory, syndromic corrective intensive therapy in accordance with existing recommendations in the literature. A favorable outcome with restoration of full functional activity of the kidneys and discharge from the hospital was observed in 12 children (1 and 2 group), unfavorable outcome – in 4 children (group 3). The first group consisted of patients (5) who received intensive therapy in the ICU for up to 10 days, the second group included children (7) with a favorable outcome after intensive therapy for 11–45 days.

Data from hourly monitoring of body temperature, parameters of DBP, SBP, and body temperature are presented. The assessment of changes in the components of the circadian rhythm was carried out by obtaining indicators of the mesor - the average daily level, the amplitude of circadian fluctuations, the range of daily fluctuations, indicators of acrophase and bathyphase of the circadian rhythm, the duration of the inversion of the circadian rhythm of the studied hemodynamic parameters. The research data were processed by the method of variation statistics using the Excel program by calculating arithmetic means (M) and errors of means (m). To assess the significance of differences between two values, the parametric Student's test (t) was used. The relationship between the dynamics of the studied indicators was determined by the method of paired correlations. The critical significance level was taken equal to 0.05.

Results and its discussion.

On the first day, the mesor of the circadian rhythm DBP was increased by 16-20 mm Hg relative to the age norm in all subjects; no significant differences in the severity of the condition were detected. In the dynamics in group 1, no significant changes were observed; in group 2, only on the 18th day there was a decrease in the mesor of the circadian rhythm of DBP by 15% ($p < 0.05$), however, on the 26th day an increase in the indicator to 100 mm RT was noted, which caused longer intensive therapy with continuation of daily hemodialysis sessions due to recurrent anuria until renal excretory function is restored. In group 3, throughout the observation period, the circadian rhythm mesor was consistently increased by 23-25 mm Hg relative to the norm.

A comparative analysis revealed a significantly significant increase in the mesor indicator of the circadian rhythm DBP in group 3 relative to the indicator in group 1 on days 2,3,4,6 by 14%, 14%, 11%, 30% ($p < 0.05$, respectively) . The studied indicator of children in group 3 turned out to be higher than in group 2 on days 2, 3, 4, 6, 8 by 12%, 21%, 20%, 18%, 16% ($p < 0.05$, respectively). Thus, the effectiveness of vasoactive therapy was least effective in children of group 3. Already from the second day of treatment, the DBP indicators of children with an unfavorable outcome significantly exceeded the data in groups 1 and 2, and were above the norm by more than 20 mm Hg throughout the entire treatment (Fig. 1). The lack of sufficient effectiveness of vasodilating antihypertensive therapy in the first few days is a sign of an unfavorable prognosis in the anuric phase in preschool children.

Table1.

Dynamics of the mesor of the circadian rhythm DBP

Days	1 group	2 group	3 group
1	76±6	79±6	83±7
2	69±6	70±4	79±2 ^m ''
3	76±3	70±7	85±3 ^m ''
4	77±3	70±2	86±3 ^m '''
5	74±3	74±3	79±4
6	65±6	72±2	85±3 ^m ''
7		76±3	79±3
8		74±3	86±2 ^{''}
9		76±2	79±3
10		76±3	68±4
11		73±3	74±4
12		80±3	78±5
13		76±3	79±4
14		81±4	83±3
15		80±3	85±3
16		71±4	87±4
17		72±5	83±6
18		67±2*	74±5
19		72±5	84±6
20		78±5	85±3
21		80±5	87±6
22		76±4	85±6
23		78±4	82±5
24		78±9	83±5
25		75±6	84±5
26		100±8*	78±6
27		105±9*	78±5
28		80±18	79±6
29			81±4
30			81±2

Table 2

Average values of DBP in the circadian rhythm

Hours	1 group	2 group	3 group
8	71±7	80±8	86±6 ^m
9	72±7	79±7	83±7
10	75±4	76±5	80±5

11	74±3	76±6	80±6
12	75±8	76±7	80±6
13	74±6	75±6	80±5
14	72±4	76±6	81±5
15	72±3	78±7	83±5 ^{'''}
16	73±5	78±7	81±5
17	73±5	80±9	82±5
18	73±5	77±8	82±6
19	69±5	78±8	82±5 ^{'''}
20	77±2	79±7	82±5
21	76±3	78±7	81±5
22	72±7	77±8	83±5
23	69±5	76±7	81±6 ^{'''}
24	71±7	77±8	81±5
1	69±5	75±8	81±5 ^{'''}
2	71±6	75±7	81±5
3	71±4	78±11	79±6
4	69±7	76±7	80±5
5	70±6	76±8	81±5
6	75±4	76±8	82±4
7	71±6	76±7	82±6

*-reliable relative to the indicator for 1 day

'''-reliable relative to the indicator in group 1

''-significant relative to the indicator in group 2

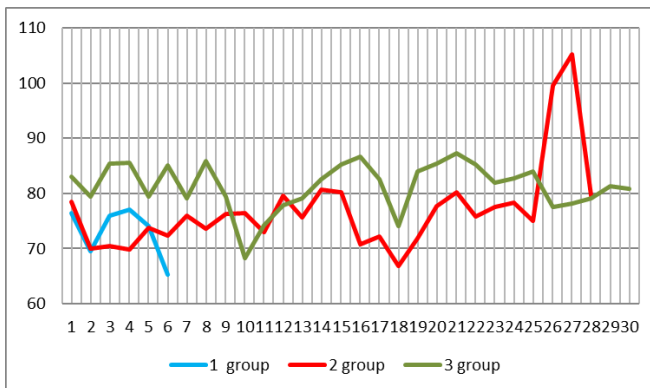


Figure 1. Dynamics of the mesor of the circadian rhythm DBP at the age of 3.1-7 l, mmHg.

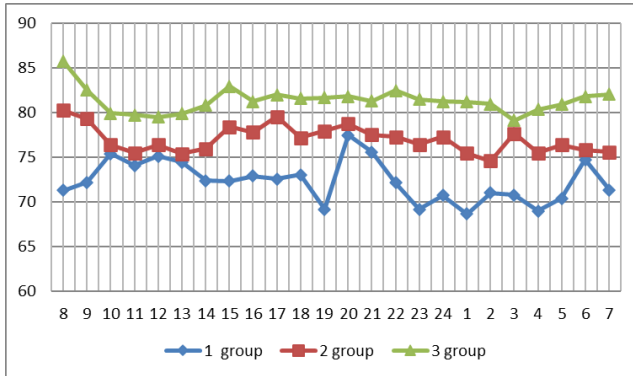


Figure 2. Average values of DBP in the circadian rhythm in the anuric phase at the age of 3.1-7 years

Analysis of average DBP values in the circadian rhythm showed the most noticeable daily fluctuations in DBP in group 1 with a shift in acrophase by 20 hours (9 hours clockwise) (Fig. 2). Low-amplitude fluctuations in DBP in groups 2 and 3, and at a higher level of DBP in group 3. A significant excess of the DBP indicator in children of group 3 relative to the indicator in group 1 was revealed at 8, 15, 19, 23, 1 o'clock in the morning ($p < 0.05$, respectively) (Table 2).

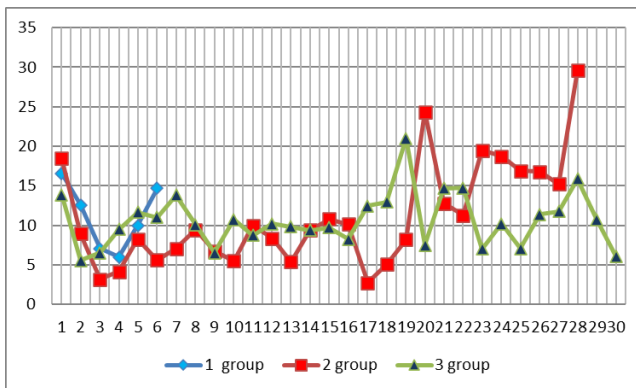


Figure 3. Dynamics of DBP amplitude, mmHg.

The approximately one-week period of fluctuation in the amplitude of the circadian rhythm of DBP at the beginning of intensive therapy is noteworthy. Further, after low-wave flattened oscillations from days 8 to 16, instability of peripheral vascular tone was noted in the form of an increase in the amplitude of the circadian

rhythm of DBP in groups 2 and 3 (Fig. 3). The comparatively lower amplitude of the circadian rhythm of DBP in children of group 3 after the 20th day indicates the development of an unresponsive state of the vascular system, which was one of the mechanisms of thanatogenesis in the most severe group of children.

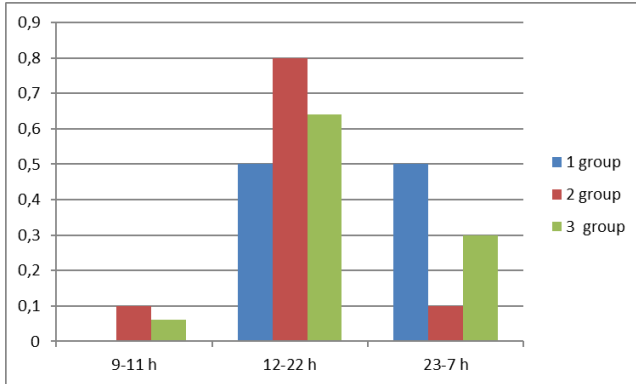


Figure 4. Duration and severity of acrophase shifts in the circadian rhythm of DBP

It is noteworthy that the duration of inversion of the circadian rhythm of DBP prevailed in percentage terms in group 1 (Fig. 4). In absolute numbers, inversion of the circadian rhythm of DBP was detected within 3 days in children of groups 1 and 2, and 9 days in group 3. Thus, the most pronounced disturbances in the phase structure of the circadian rhythm of DBP were found in patients of group 3.

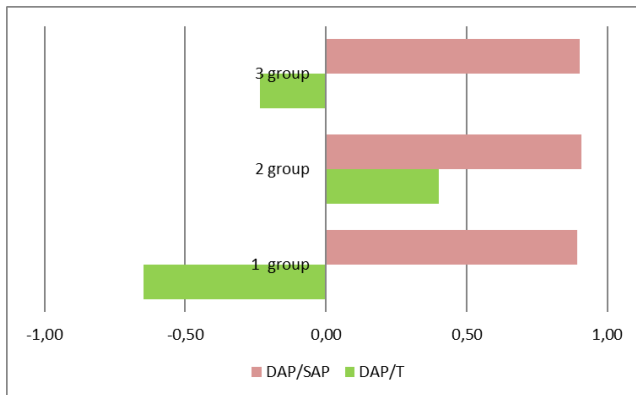


Figure 5. Correlations of DBP in acute renal failure in children aged 3.1-7 years.

In all groups, regardless of the severity of the condition, a significant direct correlation between DBP and SBP was revealed, which was in groups 1, 2 and 3 (0.8; 0.9; 0.9, respectively) (Fig. 5). A noticeable physiological tendency to decrease DBP during a hyperthermic reaction (-0.65) was noted only in group 1. In group 2, a change in the correlation vector in the opposite direction (0.4) appears to be a pathogenetic sign, indicating the emergence of a tendency to spasm of systemic vessels with an increase in the inflammatory response.

Conclusion: On the first day, the mesor of the circadian rhythm DBP was increased by 16-20 mm Hg relative to the age norm in all subjects. In group 3, throughout the observation period, the circadian rhythm mesor was consistently increased by 23-25 mm Hg relative to the norm. A significant excess of the DBP indicator in children of group 3 relative to the indicator in group 1 was revealed at 8, 15, 19, 23, 1 am. The comparatively lower amplitude of the circadian rhythm of DBP in children of group 3 after the 20th day indicates the development of an unresponsive state of the vascular system, which was one of the mechanisms of thanatogenesis in the most severe group of children.

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儿童急性肾衰竭无尿期全身炎症反应的年龄相关特征
**AGE-RELATED FEATURES OF THE SYSTEMIC
INFLAMMATORY RESPONSE IN THE ANURIC PHASE OF ACUTE
RENAL FAILURE IN CHILDREN**

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注解。第 1 组(重症监护期间最多 10 天)的中枢昼夜节律波动在两个年龄组(最多 3 岁、3.1-7 岁)中几乎同时发生,并且青春期前的指数略有超标。在第 2 组较严重的患者中(在 ICU 治疗超过 10 天,结果良好),体温动态的年龄差异表现为第 2 组近周节律周期的增加,长达 10 天,更大变形,并且近周节律的幅度比婴儿期增加。两个年龄段的不良结果所揭示的变化表明抗菌、抗炎、排毒治疗在两个年龄段均无效。

关键词: 炎症反应, 无尿, 急性肾功能衰竭, 儿童。

***Annotation.** Fluctuations of the mesor circadian rhythm of body temperature in group 1 (up to 10 days of intensive care) in both age groups (up to 3 years, 3.1-7 years) occurred almost synchronously with insignificant excess of the index in preadolescence. In more severe patients of group 2 (in ICU more than 10 days with a favourable outcome) age differences in the dynamics of body temperature were expressed in an increase in the period of the near-weekly rhythm in group 2 up to 10 days, greater deformation, and an increase in the amplitude of the near-weekly rhythm than in infancy. The revealed changes in both age groups at unfavourable outcome demonstrated ineffectiveness of antibacterial, anti-inflammatory, detoxification therapy in both age groups.*

***Keywords:** inflammatory response, anuria, acute renal failure, children.*

Relevance. One of the main directions of drug therapy of any pathological condition complicated by critical condition, multiple organ failure syndrome (MOFS) and others is anti-inflammatory therapy, the components of which are antibacterial, non-steroidal, steroidal drugs, neurovegetative protection. In the literature it is considered mandatory to treat the underlying disease complicated by acute renal failure, anti-inflammatory therapy is part of the complex treatment. However, there is not enough information in the literature on the peculiarities of inflammatory reaction in ARF developed against the background of acute bacterial pulmonary infection in children under 3 years of age [1-4].

Purpose of the work. To study and give a comparative evaluation of temperature reaction depending on age in acute renal failure.

Material and methods of research. Indications for dialysis (renal replacement therapy (RRT) were: anuria for more than 24 hours with progressively worsening condition of the patient; increasing urea level more than 25 mmol/l. We studied the data of hourly monitoring of body temperature in 10 children with acute renal failure who were admitted to the ICU of RRCEM with anuria from 1 to 4 days from the ICU of regional children's hospitals and branches of RRCEM. Before admission to the clinic, all patients received anti-inflammatory therapy aimed at the treatment of acute glomerulonephritis, acute acute respiratory infection, pneumonia, and acute intestinal infections. On indications due to severe progressive respiratory failure in the first day invasive mechanical respiratory support was provided. All patients underwent haemodialysis, plasmapheresis (2) children at the age of 2, 3 months under control of haemodynamics, acid-base state, respiratory system, supportive, antibacterial, anti-inflammatory, syndrome corrective intensive therapy. A favourable outcome with restoration of full functional activity of kidneys and discharge from hospital was observed in 44 children (1,2 groups), unfavourable outcome - in 19 children (3 group). The division into groups was dictated by the duration of intensive therapy in ICU according to the severity of the condition. Thus, in group 1 (up to 10 days in ICU) we studied the indices of 15 children under 3 years of age, 5 patients aged 3.1-7 years. Group 2 (more than 10 days in ICU with a favourable outcome) included 16 patients under 3 years old and 8 patients aged 3.1-7 years. In group 3 with unfavourable outcome were 15 infants and 4 children aged 3.1-7 years. Data of 46 patients under 3 years of age were studied, 3,1-7 years of age - 17 children. Lethality in the random sample was 30%, under 3 years of age - 33% , 3,1-7 years - 23%.

Results and their discussion.

Table 1
Dynamics of mesor circadian temperature rhythm by age

groups	1st group		2nd group		3d group	
	before 3 y	3,1-7 years	before 3 years	3,1-7 y	before 3 years	3,1-7 y
1	36,7±0,1	36,8±0,1	36,7±0,1	36,7±0,2	36,6±0,1	36,8±0,1
2	36,8±0,01	36,8±0,1	36,8±0,1	36,8±0,01	36,8±0,1	36,9±0,01
3	36,7±0,02	36,7±0,02	36,9±0,02	36,9±0,02	36,8±0,1	36,8±0,1
4	36,7±0,01	36,8±0,1	36,8±0,03	36,7±0,1	36,8±0,1	36,9±0,1
5	36,7±0,03	36,7±0,02	36,9±0,03	36,7±0,1	36,8±0,1	36,8±0,2
6	36,8±0,1	36,9±0,1	36,9±0,02	36,6±0,02	36,9±0,1	36,7±0,2
7	36,8±0,1		36,8±0,01	36,7±0,1	37,0±0,1	37,1±0,2
8	36,7±0,01		36,9±0,01	36,7±0,1*	36,9±0,1	37,0±0,1
9	36,7±0,01		36,8±0,02	36,7±0,02	37,0±0,1	37,1±0,1
10	36,6±0,1		36,9±0,01	36,8±0,1	37,0±0,1	37,0±0,1
11			36,9±0,1	36,8±0,1	37,0±0,1	36,7±0,1
12			36,9±0,01	36,8±0,1	36,9±0,1	37,0±0,1
13			36,9±0,1	36,9±0,1	36,9±0,1	36,7±0,1
14			36,9±0,01	36,9±0,1	37,1±0,1	37,0±0,1
15			36,9±0,1	36,9±0,1	36,9±0,1	36,7±0,03
16			37,0±0,01	36,8±0,1*	36,8±0,1	36,9±0,1
17			36,9±0,1	36,8±0,1	36,9±0,1	37,0±0,1
18			36,8±0,02	36,7±0,1	36,9±0,1	37,0±0,2
19			36,8±0,02	36,6±0,1*	36,8±0,2	37,0±0,1
20			36,9±0,1	36,9±0,1	37,0±0,1	36,9±0,1
21			36,9±0,1	36,7±0,1*	36,9±0,1	36,8±0,1
22			37,0±0,1	36,6±0,2*	37,0±0,1	36,8±0,2
23			36,8±0,02	36,7±0,1	36,8±0,1	36,9±0,1
24			36,8±0,1	36,7±0,1	36,8±0,2	36,9±0,1
25			37,0±0,1	36,6±0,1*	37,1±0,01	36,7±0,1
26			37,0±0,1	36,7±0,01*	36,9±0,1	36,8±0,2
27			36,7±0,1	37,0±0,1*	37,1±0,1	36,9±0,3
28			36,8±0,1	37,3±0,2*	37,4±0,1	37,1±0,1
29			37,0±0,1		37,2±0,3	36,9±0,1
30			37,1±0,1		37,1±0,1	37,0±0,1

*-significant relative to the index in the group under 3 years of age

No significant differences in the mesor circadian rhythm of body temperature in group 1 by age in the anuria phase of ARF in children under 3 years and 3.1-7 years of age were found (Table 1). In group 2 of patients comparatively low indicators of mesor circadian rhythm of body temperature were found in children aged

3,1-7 years than in the infant period on 8, 16, 19, 21, 22,25,26 days. However, in older children on 27,28 days there was an aggravation of systemic inflammatory reaction ($p<0,05$, respectively) (Table 1). Apparently, this difference is caused by decreased effectiveness of anti-inflammatory therapy, tolerance or reinfection of nosocomial infection in ICU. However, the absence of temperature response in severe infantile patients on the same days may be a consequence of areactivity of temperature response due to acquired or congenital immunodeficiency. Factors disposing to the development of immune defence failure in infancy are much more than in older children. This is not only compensatory, adaptive failure of anatomic-functional structures, but also more pronounced insecurity from external influences, dependence on the quality of care. That is, a decrease in body temperature in infancy is not the main objective indicator of the effectiveness of antibacterial, anti-inflammatory therapy, given that it may be one of the signs of immunodeficiency or the result of a side effect of drug correction (non-steroidal and steroidal anti-inflammatory drugs, physical effects, neurovegetative blockade). Whereas fever reduction in older age is more often accompanied by clinical signs of improvement in the patient's condition.

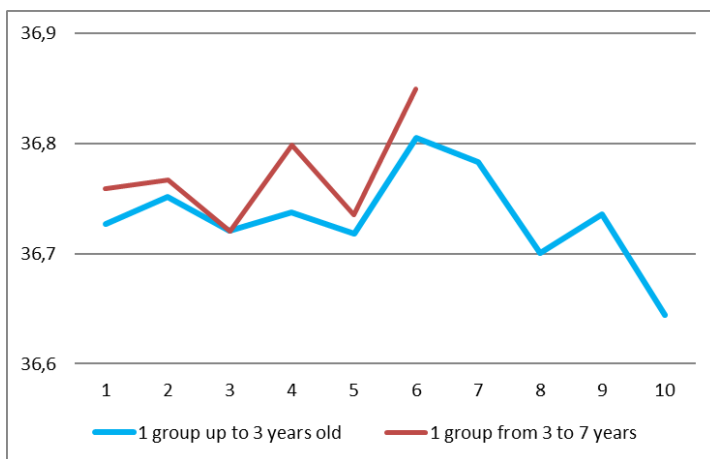


Figure 1. Dynamics of mesor T in group 1

Fluctuations of the mesor circadian rhythm of body temperature in Group 1 in both age groups occurred almost synchronously with a slight excess of the index in preschool age (Fig.1).

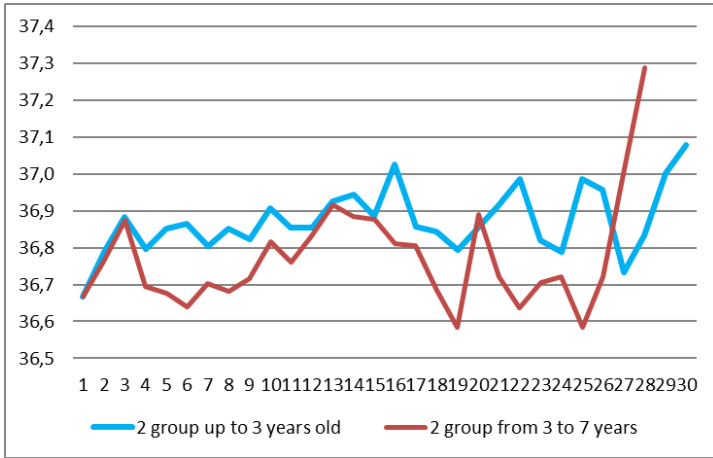


Figure 2. Dynamics of mesor T in group 2

In more severe patients of group 2, age-related differences in the dynamics of body temperature were expressed in an increase in the period of the near-weekly rhythm in group 2 up to 10 days, a greater degree of deformation, and a greater expression of the amplitude of the near-weekly rhythm than in infancy (Fig. 2).

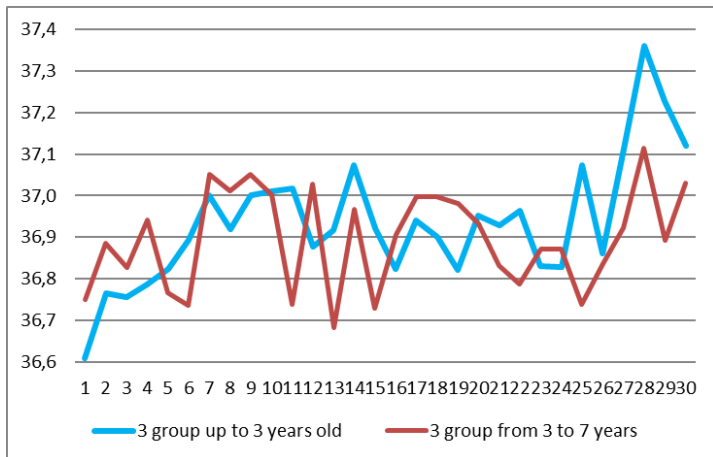


Figure 3. Dynamics of mesor T in group 3

In the most severe patients with unfavourable outcome (group 3), the temperature response in older age was characterized by a greater amplitude of fluctua-

tions; on the 28th day, the hyperthermic response in infants was significantly more pronounced than in preschool children (Fig.3). The revealed changes in both age groups demonstrated the ineffectiveness of antibacterial, anti-inflammatory, and detoxification therapy in both age groups.

Table 2.
Average hourly T values in circadian rhythm

groups	1st group		2nd group		3d group	
	before 3 years	3,1-7 y	before 3 years	days	before 3 years	3,1-7 y
8	36,7±0,1	36,8±0,1	36,8±0,1	36,8±0,1	37,0±0,2	36,9±0,1
9	36,7±0,0	36,8±0,1	36,8±0,1	36,8±0,1	36,9±0,2	36,9±0,1
10	36,7±0,1	36,8±0,1	36,9±0,1	36,8±0,1	36,9±0,1	36,9±0,2
11	36,7±0,1	36,8±0,1	36,9±0,1	36,8±0,1	36,9±0,2	36,9±0,2
12	36,7±0,1	36,8±0,1	36,9±0,1	36,8±0,1	37,0±0,2	36,9±0,2
13	36,7±0,1	36,7±0,1	36,9±0,1	36,8±0,1	37,0±0,2	36,9±0,2
14	36,7±0,01	36,7±0,02	36,9±0,1	36,8±0,1	36,9±0,2	36,9±0,2
15	36,7±0,01	36,7±0,1	36,9±0,1	36,8±0,1	37,0±0,2	36,9±0,2
16	36,7±0,01	36,8±0,1	36,9±0,1	36,8±0,1	37,0±0,1	36,9±0,2
17	36,7±0,1	36,8±0,1	36,9±0,1	36,8±0,1	36,9±0,2	36,9±0,2
18	36,7±0,02	36,9±0,1*	36,9±0,1	36,8±0,1	37,0±0,2	36,9±0,2
19	36,8±0,1	36,8±0,1	36,9±0,1	36,8±0,1	37,0±0,2	36,9±0,2
20	36,8±0,1	36,8±0,1	36,9±0,1	36,8±0,2	36,9±0,2	36,9±0,1
21	36,8±0,1	36,8±0,1	36,9±0,1	36,7±0,1	36,9±0,2	36,9±0,2
22	36,7±0,1	36,8±0,1	36,9±0,1	36,7±0,1	36,9±0,2	36,9±0,1
23	36,8±0,1	36,8±0,02	36,9±0,1	36,8±0,1	36,9±0,2	36,9±0,1
24	36,7±0,1	36,7±0,1	36,9±0,1	36,8±0,2	36,9±0,1	36,9±0,1
1	36,7±0,1	36,7±0,1	36,9±0,1	36,8±0,1	36,9±0,1	36,9±0,1
2	36,8±0,1	36,8±0,1	36,9±0,1	36,8±0,1	36,9±0,2	36,9±0,1
3	36,7±0,1	36,8±0,1	36,9±0,1	36,8±0,1	36,9±0,1	36,9±0,1
4	36,7±0,1	36,8±0,1	36,9±0,1	36,8±0,1	36,9±0,2	36,9±0,1
5	36,7±0,02	36,8±0,1	36,9±0,1	36,8±0,1	36,9±0,1	36,9±0,1
6	36,7±0,1	36,8±0,1	36,9±0,1	36,8±0,1	37,0±0,1	36,9±0,1
7	36,8±0,1	36,8±0,1	36,9±0,1	36,8±0,1	37,0±0,1	36,9±0,1

*-significant relative to the index in the group under 3 years of age

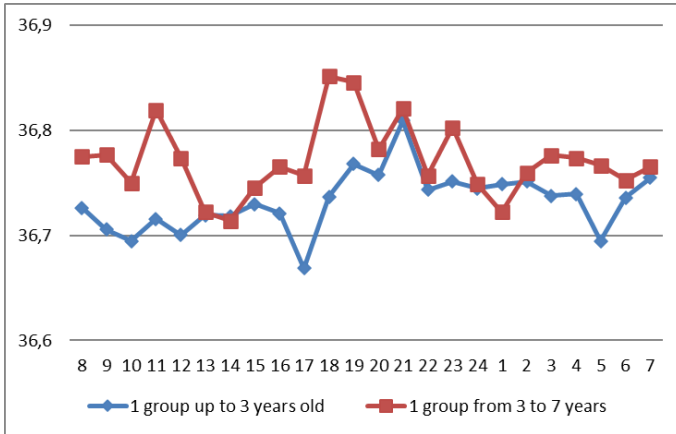


Figure 4. Average values of T in the circadian rhythm in group 1

Hourly assessment of average values of body temperature in the circadian rhythm in group 1 allowed to reveal a tendency to a comparatively more pronounced temperature reaction in the older age (tab. 2) with a significant excess in the older group at 18 hours ($p < 0.05$) with the acrophase of the circadian rhythm of body temperature in the older group at 18 hours. While in infancy there was a shift of the acrophase of circadian rhythm by 21 hours, more pronounced deformation of the structure of circadian rhythm of temperature (Fig.4).

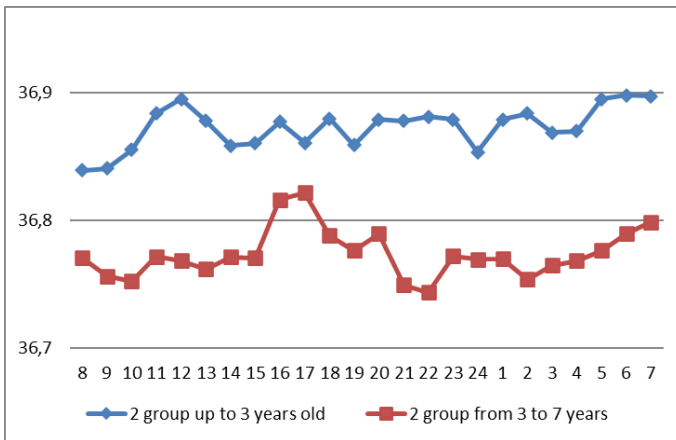


Figure 5. Average T values in the circadian rhythm in group 2

It is noteworthy that the fluctuations of the average circadian rhythm T in children under 3 years of age in group 2 occurred at a slightly higher level (the difference is insufficiently significant) than in older children (Fig.5).

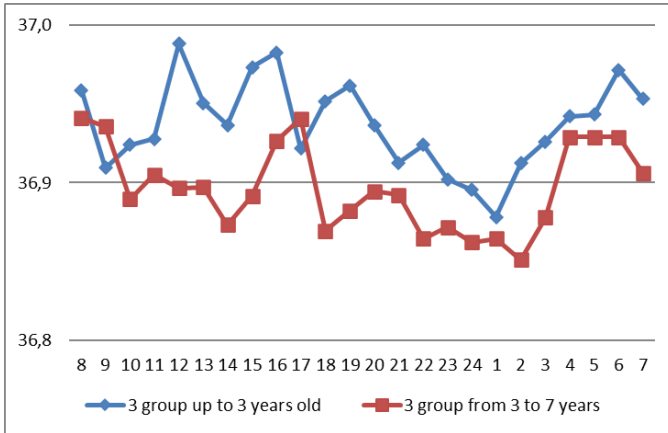


Figure 6. Average T values in circadian rhythm in group 3

In the most severe group of children, the average hourly daily temperature fluctuations in infants were slightly higher than in the older group. At the age of up to 3 years, the acrophase migrated to 12 hours of the day, in the older group at 17 hours (Fig.6).

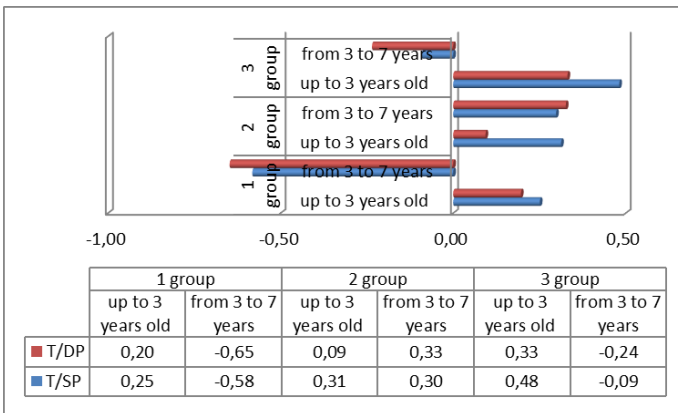


Figure 7. Correlations of body temperature

The inverse correlation of body temperature dynamics with DBP (-0.65), and with SBP (-0.58) indicated a more active participation of haemodynamic parameters in the compensatory reaction in older children than in infancy (Fig.7). In group 2, the correlations decreased significantly, characterising a drop-off in the participation of haemodynamic parameters in conditions of anuria caused by more severe renal damage. In group 3, a marked trend of direct correlation between temperature and SBP (0.48) appeared (Fig.7). The latter cannot be considered a physiological reaction of cardiac output increase in response to hyperthermia with unfavourable outcome of the disease in group 3 children.

Conclusion. Fluctuations of the mesor circadian rhythm of body temperature in group 1 in both age groups occurred almost synchronously with insignificant excess of the index in preschool age. In more severe patients of group 2 age differences of body temperature dynamics were expressed in the increase of the period of circadian rhythm in group 2 up to 10 days, greater degree of deformation, greater expression of amplitude of circadian rhythm than in infancy. The revealed changes in both age groups at unfavourable outcome demonstrated the ineffectiveness of antibacterial, anti-inflammatory, detoxification therapy in both age groups.

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根治性前列腺切除术中的盆腔淋巴结切除: 围手术期和肿瘤学结果
**PELVIC LYMPH NODE DISSECTION IN RADICAL
PROSTATECTOMY: PERIOPERATIVE AND ONCOLOGICAL
RESULTS**

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抽象的。目前,在患有前列腺癌的男性中,对盆腔淋巴结清扫术(PLND)中获得的材料进行组织学研究是对肿瘤过程进行分期和术后疾病结果预后的最准确和可靠的方法,这是影响最重要的选择的重要因素。根治性前列腺切除术后有效的治疗方法。本研究的目的是对结合标准或扩展 PLND 的根治性前列腺切除术(RPE)的围手术期和治疗(肿瘤学)结果进行比较研究。材料和方法。该研究的材料是812名43岁至78岁男性在不同时间段(2009年1月至2018年12月)接受局部或局部扩散前列腺癌cT1a-cT3bNOMO期住院治疗的病历数据。结论。研究结果证实了EAU专家的结论:1)在根治性前列腺切除术中进行扩大盆腔淋巴结清扫以诊断中度或高度前列腺癌患者盆腔淋巴结转移灶的适当性 进展; 2)目前缺乏关于PLND的肿瘤学(治疗)有效性的数据。

关键词: 标准和扩展盆腔淋巴结清扫术, 根治性前列腺切除术, 前列腺癌。

Abstract. *Currently, in men having prostate cancer, histological study of the material obtained in pelvic lymph node dissection (PLND) is the most accurate and reliable method of staging the tumor process and postoperative prognosis of disease outcomes, an important factor influencing the choice of the most efficient treatment approach after radical prostatectomy. The aim of this research was to make a comparative study of perioperative and therapeutic (oncological)*

results of radical prostatectomy (RPE) performed in combination with standard or extended PLND. **Materials and methods.** The materials of the research were the data from medical records of 812 men aged 43 to 78 years undergoing an inpatient treatment for localized or locally spread prostate cancer in stages cT1a-cT3bN0M0, at different time period (from January 2009 to December 2018).

Conclusion. The results of research confirm the experts' conclusions of the EAU about: 1) the propriety of performing extended pelvic lymph node dissection in radical prostatectomy in order to diagnose metastatic lesions of the pelvic lymph nodes in patients with an intermediate or high risk of prostate cancer progression; 2) the lack of data on the oncological (therapeutic) expediency of PLND at present.

Keywords: standard and extended pelvic lymph node dissection, radical prostatectomy, prostate cancer.

Introduction

While treating prostate cancer it's important to perform early diagnostics of the formed secondary tumor nodes of the same histological structure in pelvic lymph nodes (PLN). However, there is insufficiency of findings (not more than 40%) about the methods of visualizing metastatic lesions of PLN (lymphography and lymphoscintigraphy, ultrasound examination, computed tomography and magnetic resonance imaging) [1-4]. Nowadays the only effective method of revealing this form of pathology remains the morphological study in which the material (pelvic lymph nodes with the surrounding adipose tissue) is obtained by open, laparoscopic or robotic pelvic lymph node dissection (PLND). Moreover, laparoscopic techniques of PLND are considerably less traumatic compared to an open surgery [5,6].

Depending on the extent of the removed lymphoid tissue there are the following types of PLND: 1) limited (LPLND) in which obturator PLN are excised; 2) standard (SPLND) in which both obturator and external iliac lymph nodes are excised; 3) extended (EPLND) in which both obturator and external and internal iliac lymph nodes are removed. N. Fossati and al. (2017) define superextended pelvic lymph node dissection (common iliac, presacral and/or other PLN are added to the mentioned above) and indefinite PLND [7]. In Figure 1 regions of different PLN groups are shown by dotted lines.

The types of PLND described above don't have the same diagnostic value: extremely low for the limited and standard variants (in such cases it's possible to underestimate the number of affected PLN in nearly 50% of patients) [8] and considerably higher for extended PLND [9-12]

In 2013 S. Joniau et al. published the results of their own investigations related to evaluating the diagnostic efficiency of PLND. This research included 74 patients having prostate cancer in stage cT3 and the risk of PLN metastatic lesion

from 10% to 35% (according to Alan Partin nomogram). In order to evaluate the state of lymph outflow tracts from prostate and to reveal the affected PLN before the surgery each patient was injected intraprostate nanocolloid technetium-99 and was performed planar scintigraphy (PSG) and single-photon emission computed tomography (SPECT). Only after that, extended pelvic lymph node dissection and radical prostatectomy were performed. The results of histological study of the material obtained in PLND were compared to the findings of PSG and SPECT. Thus, S. Joniau et al. found out that among 74 patients having supposed PLN lesion only 34 patients (45.9%) really had that lesion. At the same time among 34 patients metastatic signs in PLN were revealed only in 32 patients (94.1%) and the affected lymphoid tissue was completely removed in 26 patients out of 34 (76.5%). As S. Joniau et al. conclude that increase of the considered criteria from 94.1% to 97.1% and from 76.5% to 88.2% is possible in case of excising not only external and internal iliac and obturator PLN on PLND, but also presacral lymph nodes (superextended PLND defined by N. Fossati et al.)^[7,13]. Conclusions of S. Joniau et al. are confirmed by the research results of C. Acar et al. (2015), that is "... after PLND affected sentinel nodes can be detected in 3.6-36% of men having intermediate and high risk prostate cancer..." (cited by C. Acar et al., 2015)^[14].

The most characteristic complications of PLND are, firstly, forming of post-operative lymph cysts (lymphocele, LC), secondly, - thromboembolic impairment (deep vein thrombosis (DVT) of lower limbs and pelvis, pulmonary embolism). Lesions of major vessels and nerves are also possible.^[15] According to the general review data, retroperitoneal lymphocele develop in 6.4-27% of men undergoing PLND and RPE (depending on the number of removed PLN)^[16-21] and, as defined by W.Y. Khoder et al., can cause "... edema of lower limbs in 4.3% of cases, painful sensation in 3% of cases, vein thrombosis in 1.3% of cases, abscess formation in 1.3% of cases and urinary bladder compression with progressing augmenting of urinary incontinence in 0.3% of cases (cited by W.Y. Khoder et al., 2011)^[18].

In 2016 N.Fossati et al. performed a comparative assessment of the results of 66 clinical investigations (totally 275269 patients) which were conducted by other specialists from January 1980 to December 2015 and were supposed to define the therapeutic role of limited, standard and extended PLND in men undergoing radical prostatectomy in terms of treating PC in stages T1-3N0M0. The criteria of therapeutic efficiency of PLND were development / absence of biochemical recurrence after intervention, appearance / absence of remote metastasis (clinical recurrence), specific and overall survival after treatment, frequency of complications induced by PLND, functional outcomes (state of erectile function and urinary continence function). The comparative assessment results of the criteria of the therapeutic role of PLND, according to N. Fossati et al., are presented like the following conclusions: firstly, in most investigations there hasn't been confirmed

the supposition about the interrelation between the overall and specific survival and a) performance / omission of PLND, b) extent of PLND; secondly, expanding the borders of lymph dissection has no marked effect on the state of erectile function and urinary continence function; thirdly, due to contradiction of the investigation results it turns out to be impossible to judge about the presence / absence of interrelation between performance / omission of different types of PLND and development of biochemical and clinical recurrence [7].

Basing on the review data, almost all the investigators agree with the mentioned statement (about uncertainty of the therapeutic role of PLND in present medicine) [22-26]. Despite this, pelvic lymph node dissection in its extended version is recommended by European Association of Urology (2018) while treating PC in patients having the risk of PLN metastasis more than 5% [27]. Histological study of the material obtained in PLND is at present the most accurate and reliable method of staging the tumor process and postoperative prognosis of outcomes, the most important factor of determining the most efficient therapeutic approach after intervention [28-31]. Thus, diagnostic value of PLND is not doubtful, but the issue about the therapeutic efficiency of this procedure is debatable. The aim of this research is to make a comparative study of perioperative and therapeutic (oncological) results of radical prostatectomy performed in combination with standard or extended PLND.

Materials and methods of the research

The research was carried out in the City Centre of Endoscopic Urology and New Technologies (CCEU&NT) which functions in St. Luke's Clinical Hospital (St. Petersburg). The materials of the research were the data from 812 medical records of men aged 43 to 78 undergoing an inpatient treatment in CCEU&NT for localized and locally spread prostate cancer in stages cT1a-cT3bN0M0 at different time within the period from January 2009 to December 2018. The research method was a retrospective analysis of the data from the selected medical records.

Preoperative examination included determining PSA level in blood serum (ng/mL), digital rectal examination, prostate biopsy followed by histological evaluation of the biopsy material, ultrasound examination of abdominal organs, retroperitoneal space and small pelvis organs, as well as a number of common clinical tests (cellular and biochemical blood study, coagulogram, urine test, ECG, physician and other specialists consultation), bones scanning (in the subgroup of intermediate- and high-risk patients), as well as MRI of small pelvis organs (if planning a nerve-saving RPE and in cases of high-risk progressing PC).

In terms of surgical treatment each patient was performed laparoscopic radical prostatectomy (LRPE), patients with intermediate- and high-risk PC were performed LRPE in combination with standard or extended lymph node dissection. Principally, standard PLND was performed till 2014, further on all the patients with intermediate- and high-risk PC were performed only extended PLND.

Three research groups were formed depending on performance / omission of PLND and the extent of pelvic lymph node dissection (Table 1). Group 1 (n=112) included the patients with low-risk PC (cT1-T2a, PSA level in blood serum less than 10 ng/mL, total Gleason score 2-6, according to D'Amico et al. classification), surgery aid for the men from group 1 was restricted by radical prostatectomy. Groups 2 and 3 included 700 patients who had intermediate- and high-risk progressing PC on examination (according to D'Amico et al. classification, cT2b-cT2c and cT3a, serum PSA level 10-20 ng/mL and more than 20 ng/mL, total Gleason score 7 and 8-10). Patients from group 2 underwent surgical treatment of PC till 2014 (n=336), radical prostatectomy was preceded by standard PLND, in group 3 (n=362) – by extended PLND.

Within five years of observation (60 months) the following parameters were assessed: 1) duration of surgical intervention (min), volume of intraoperative blood loss (ml), length of hospital stay after surgery (days); 2) occurrence of intra- and postoperative complications; 3) number of removed lymph nodes (LN) and frequency of metastatic lesion; 4) frequency of biochemical recurrence (BCR); 5) overall and cancer-specific survival (OS and CSS, respectively).

The criterion of complete biochemical response after surgery was considered decrease of serum PSA level up to 0.2 ng/mL and less. To reveal BCR within 5 years after inpatient treatment control of serum PSA level was carried out. Determining this parameter was performed once in 3 months during the first 3 postoperative years and once in 6 months during the remaining 2 years. Two consecutive increases of serum PSA level by more than 0.2 ng/mL were viewed as a biochemical recurrence according to EAU recommendations [32–34].

Statistical comparative analysis of the data obtained in groups 1, 2 and 3 was performed using the program «IBM® SPSS® Statistics» (version 23 Russian) and program «Microsoft® Excel® 2010». To make statistical processing of quantitative continuous independent variables (time of surgical intervention, volume of blood loss, length of hospital stay) there was used the unpaired comparison Student's t-test in cases with nearly normal distribution, Mann-Whitney test – in abnormal distribution of the values. To make statistical analysis of category variables (development / absence of postoperative complications (lymphocele, edema of lower limbs, pain, thrombosis, infection, urinary bladder compression) there was used criterion χ^2 and Pearson's test. Evaluating the probability of biochemical recurrence, overall and cancer-specific survival depending on performance / omission of PLND and its extent was performed using Kaplan-Meier analysis, in which censored data were those of 1) patients being out of observation due to changing the place living or refusing to take part in the research; 2) patients who had no event (biochemical recurrence or fatal outcome) within the whole follow-up period.

Results of the research

As shown in Table 2, in men from group 1 (n=112) surgical intervention (only RPE without pelvic lymph node dissection) lasted 96-248 minutes (median – 173 min, mode – 187, average value - 173.52±43.01 min). In groups 2 and 3, where prostate removal was preceded by standard or extended PLND, the average time of surgery was 184.35±48.53 min and 186.50±43.32 min, respectively (p>0.05), and statistically exceeded that of group 1.

The average volume of intraoperative blood loss in groups 2 and 3, where PLND was performed, was 161.38±95.85 ml (median 116, mode 114) and 163.17±94.75 ml (median 117, mode 115) respectively, statistically significant differences between these values were not noted. In patients from group 1 this parameter was 157.02±88.28 ml and showed no statistically significant difference from the results in comparison groups.

Men, undergoing RPE in combination with standard and extended PLND, stayed in hospital for 3-6 days (median – 4, mode – 3), the average number of hospital bed-days in groups 2 and 3 showed no statistically significant difference. Length of hospital stay after RPE without pelvic lymph node dissection was statistically shorter (not more than 2-4 days) and the average was 2.67±0.65 bed-days.

Within 3-11 weeks after surgical intervention development of lymphocele was registered in 12 men from group 2 and in 49 men from group 3 - 3.7% and 13.5% respectively, taking the total number of patients in each group as 100%. In group 1 where RPE was performed without removing pelvic lymph nodes, no cases with postoperative lymphocele were registered. The results of statistical analysis of the obtained data which was carried out using χ^2 -criterion and Yates's correction for continuity (Table 3) confirmed direct statistical interrelation between LC development and pelvic lymph node dissection as well as between LC development and extent of PLND.

Such postoperative complications as edema of lower limbs, pain, thrombosis, infection process or urinary bladder compression were observed in 7 men from group 1 out of 112 (6.3%), in group 2 – in 23 men out of 336 (6.8%), in group 3 – in 32 men out of 364 (8.8%). There was no statistical interrelation between the development of these conditions and preserving / removing pelvic lymph nodes in the considered extent (Table 4).

All the material obtained in standard and extended pelvic lymph node dissection contained totally 14505 lymph nodes. In group 2, where SPLND was performed, this parameter was 5115, in group 3 (RPE + EPLND) – 9389. As shown in Table 5, for the patients from group 2 the average number of lymph nodes which were removed in each certain case was 15.22±6.84 (2-34, Me – 14, Mo – 12), for the patients from group 3 - 25.79±8.12 (6-65, Me – 26, Mo – 26). According to the findings of histological study of the obtained material, PLN metastatic lesion was revealed in 6.5% of men from group 2 and in 19.0% of men from group 3.

To analyze the frequency of developing biochemical recurrence and the longest duration of progression-free period after surgery there was used Kaplan –Meier analysis. The principal results are given in Table 5 and Figure 2. According to the given findings, within a 5-year follow-up period (60 months) BCR was registered in 143 patients. Among them 9 men (8.04% of the total number of patients in the group) underwent only radical prostatectomy, 100 patients (29.76%) – SPLND and RPE in one operation session, 34 patients (9.34%) – EPLND and RPE.

The shortest duration of progression-free period was noted after performing combined SPLND and RPE (48.58±1.06 months), statistically more significant – after RPE (56.68±1.09 months) and after RPE in combination with EPLND (54.84±0.84 months).

After surgical intervention in group 1 there were registered 11 fatal outcomes for different reasons. Except for PC recurrence (n=5) these reasons were cardiovascular collapses (n=3) and accidents (n=2); one of the patients died due to unlawful actions.

Thus, (as shown in Table 7 and Figure 3) 5-year overall survival of patients undergoing radical prostatectomy without pelvic lymph node dissection was 90.2%, the longest life span after surgery was 57.35±0.86 months (95% confidence interval 55.68-59.03 months). In groups 2 and 3, where RPE was performed in combination with standard and extended PLND respectively, OS indices were lower than those in group 1 by 1.8% and 0.9%, respectively. However, these differences were statistically significant.

Absolute number of fatal outcomes due to local PC recurrence in groups 1, 2 and 3 was 3, 14 and 11, respectively, due to remote metastasis – 2, 6 and 7, respectively.

As shown in Table 8 and Figure 4, indices of 5-year cancer-specific mortality (CSM) in research groups 1, 2 and 3 were 4.5%, 6.0% and 4.9%, respectively, but indices of cancer-specific survival were 95.5%, 94.0% and 95.1%, respectively. The longest survival period in cases with fatal outcomes after RPE was 59.03±0.49 months, after RPE and SPLND - 58.53±0.37 months, after RPE and EPLND - 57.50±0.58 months, 95% confidence interval was 58.06-59.99, 57.81-59.26 and 56.37-58.63 for groups 1, 2 and 3, respectively. There were no statistically significant differences between distribution of CSM and CSS in the studied groups.

Therefore, according to the results of the analysis of the obtained data, performing RPE in combination with pelvic lymph node dissection, both standard and extended, was unlikely to be an absolute factor of increasing intraoperative blood loss volume and length of hospital stay after surgery, although the total duration of these interventions (min) due to performing PLND increased by 6% compared to that without pelvic lymph node dissection.

Performing RPE and PLND (standard or extended) in one operation session pelvic lymph node dissection was likely to become the risk factor of postoperative lymphocele, whereas probability of LC development statistically significantly increased along the growth of PLND extent.

Frequency of developing other complications in RPE, RPE and SPLND as well as RPE and EPLND (edema of lower limbs, pain, thrombosis, infection process or urinary bladder compression) didn't exceed 6-9% and found no statistically significant dependence on performing / omission of SPLND or EPLND in radical prostatectomy.

Diagnostic facilities of EPLND exceeded those of SPLND: on histological study of the biological material obtained in extended pelvic lymph node dissection metastatic PLN lesion was revealed in 19.0% of patients, in SPLND – in 6.5% of patients. Meanwhile, risk of PC progression in patients undergoing EPLND and in patients undergoing standard PLND was the same – intermediate and high.

Probability of biochemical recurrence in patients with intermediate and high PC risk (according to D'Amico et al. classification) after performing EPLND and RPE in one operation session was 9.34% and didn't statistically significantly exceed that in patients with low PC risk undergoing RPE without pelvic lymph node dissection. In men with intermediate and high PC risk after standard PLND and radical prostatectomy, frequency of BCR was three times higher ($p < 0.001$).

Five-year cancer-specific mortality and five-year cancer-specific survival of patients wasn't statistically significantly associated with surgical aid (only RPE, SPLND and RPE, EPLND and RPE) and was 4.5-6.0% и 94.0-95.5%, respectively.

Conclusion

Results of our research confirm the experts' conclusions of European Association of Urology (EAU): 1) about the propriety and necessity of performing extended pelvic lymph node dissection in radical prostatectomy in order to diagnose metastatic lesions of the pelvic lymph nodes in patients with an intermediate or high risk of prostate cancer progression; 2) about the lack of data on the oncological (therapeutic) expediency of PLND at present. Extended pelvic lymph node dissection performed in one surgical session with radical prostatectomy is not a risk factor for the development of various intra- and postoperative complications, except for lymphocele, which forms in 3.7-13.5% of PLND cases due to intraoperative transection of lymphatic vessels and lymph accumulation in the place of removed adipose tissue.

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泌尿外科手术中的同步方法

THE SIMULTANEOUS APPROACH IN OPERATIVE UROLOGY

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概括。 同步手术 (SO), 只要各方面都得到充分发展, 可以成为治疗包括肾脏和泌尿道在内的联合外科疾病的理想选择。 然而, 目前仅在 1.5-6.0% 需要同步手术护理的病例中进行同步干预。

研究目的: 研究同时干预的围手术期结果与相应的泌尿生殖器官孤立手术的比较。

研究方法是对5748例“圣路易斯”患者手术治疗的围手术期结果进行回顾性分析。 圣卢克临床医院”。 分析每例围手术期指标: 手术总时间、术中出血量、导尿管膀胱引流时间、术后早期泌尿生殖器官感染性炎症并发症发生率(%)、手术时间。 术后住院时间、麻醉诱导时间等。

结果。 同步干预相对于两阶段或多阶段泌尿外科干预的优势在于持续时间、术中失血量、术后早期泌尿生殖器官感染和炎症并发症的发生率。

结论。 研究结果充分证实了在合并泌尿系统疾病的计划手术治疗病例中更广泛使用同步干预的便利性、相关性和必要性这一论点。

关键词: 同步泌尿外科手术, 围手术期结果。

Summary. Simultaneous operations (SO), provided that each aspect of their performing is sufficiently developed, can be an ideal option of treating combined surgical diseases, including kidneys and urinary tracts. However, at present simultaneous interventions are performed only in 1.5-6.0% cases in need of simultaneous surgical care.

Aim of the research: to study perioperative findings of simultaneous interventions compared to the corresponding isolated operations on genitourinary organs.

The research method was retrospective analysis of perioperative findings of surgical treatment in 5748 patients of “St. Luke’s Clinical Hospital”. The following perioperative indices were analyzed in each case: total operative time, volume of intraoperative blood loss, time of the urinary bladder draining by urethral catheter, frequency of infectious and inflammatory complications of genitourinary organs in the early postoperative period (%), time of hospital stay in postoperative period, time of anaesthesia induction etc.

Results. Advantages of simultaneous interventions over two- or more-staged urological interventions in terms of their duration, the volume of intraoperative blood loss, the frequency of infectious and inflammatory complications of genitourinary organs in the early postoperative period.

Conclusion. The results of the research fully confirm the thesis of expediency, relevancy and necessity of wider using simultaneous intervention in cases of planned surgical treatment of combined urological diseases.

Keywords: simultaneous urological operations, perioperative results.

Introduction

It is evident that wider using of simultaneous operations (SO) in surgical practice is going to be one of the greatest medicine achievements, a step of advancing health care, a factor facilitating the curing process for patients suffering from several surgical diseases.

However, regardless a rather high demand in SO (according to WHO, 1995, combined diseases requiring surgical treatment are registered in 25-30% of cases admitted for surgical care), these interventions are performed only in 1.5-6.0% of cases having an indication to simultaneous operations^{1,2}

Rejection from SO in the recent past – in the 80-90s – is often associated with prevalence of open interventions using less perfect anaesthesia equipment than now. In these conditions realizing two surgical technologies in one operative session was usually accompanied by increased traumatism of the operative access and risk of developing anaesthesia complications, particularly in cases of anaesthesia load more than 3 hours^[3]. Nowadays use of highly precise minimally invasive laparoscopic techniques allows to reduce the traumatism of the operative access, volumes of blood loss, probability of infecting anatomical structures etc.^[4-6]. However, many experts find it unwarranted to perform laparoscopic SO for patients whose physical status is defined as ASA-III or ASA-IV according to ASA Physical Status Classification System (plenty of these patients are elderly-aged while there is a persistent tendency of life-span increase and aging of the population)^[7-11]).

The factors restricting the use of simultaneous interventions are necessity of maintaining long carboxy-peritoneum (in laparoscopic operations due to increasing probability of developing thrombophlebitis of lower limbs, hypoventilation of lungs due to non-physiological breathing mechanism, thromboembolic complications due to decrease of blood flow speed, disorders of heart rate regulation mechanisms etc.) [12-15], increase in duration of surgical intervention, insufficient preoperative investigation etc. [16].

Regardless all the objective difficulties while performing simultaneous operations, most scientists agree that SOs are a perspective branch of present-day surgery [17-21].

Positive results of SO (safe removal of all lesions during a single intervention thus reducing the terms of treatment and excluding the probability of further exacerbation of the concomitant disease, the necessity of repeat surgery with preoperative investigation, anaesthesia load and patient's emotional sufferings etc.) were received on treating different combined diseases of abdominal, retroperitoneal and small pelvis organs surgically. Among them there are simultaneous interventions of 36 cases of synchronous cancer of stomach and colon (reported by T. Ojima et al., 2015) [22], 147 cases of simultaneous gynecological operations and gall bladder removal (n=93) or appendix removal (n=54) in women aged 24-55 suffering from obesity (according to H. Wan-g et al., 2015) [23], successful SO for right indirect inguinal hernias and cryptorchidism (n=2) (according to H. Fujishima et al., 2015) [24], inguinal hernia and left varicocele (40 cases), (according to S.S. Chen et al., 2017) [25], 41 cases of simultaneous radical prostatectomy and plastic surgery of inguinal hernia performed by means of open (n=21) and laparoscopic (n=20) interventions (according to D. Wei et al., 2004, O. Chelik et al., 2015) [26,27], simultaneous robot-assisted partial nephrectomy and radical prostatectomy in 62-year-old man with prostate cancer and bilateral renal cell cancer (reported by J.H. Jung et al., published in 2012) [28] and other cases.

The aim of the research is to study perioperative results of simultaneous interventions compared to the corresponding isolated operations on genitourinary organs.

Materials and methods of the research

During the research we carried out a retrospective analysis of perioperative results of the planned simultaneous interventions and corresponding mono-operations performed at the urology department №1 and №2 of St. Petersburg State Budgetary Institution of Health Care "St. Luke's Clinical Hospital" from 1, September 2018 to 30, December 2022.

The total number of all the surgical interventions, all the simultaneous interventions and corresponding isolated planned mono-operations (MO) performed

within this period was 5748, 482 and 5266 respectively; the relative number of SO was 8.39%, mono-operations – 91.61%.

The criteria of carrying out the research were the following characteristics: for patients in need of transurethral resection (TUR) of benign prostatic hyperplasia (BPH) – the prostate size is over 80 cm³, on performing ureterolithotripsy (URSL) – stones of the lower third part of the ureters are up to 1 cm, on performing percutaneous nephrolithotripsy (PCNL) – renal stones are up to 2 cm, for patients in need of TUR of urinary bladder tumor – tumor sized up to 2 cm, requiring optic internal ureterotomy (OIU) – unextended ureteral strictures up to 1 cm, on performing laparoscopic kidney resection – exophytic formation up to 4 cm, for patients in need of radical prostatectomy (RPE) – localized forms of prostate cancer (PC) (in all cases of SO there was performed RPE without nerve saving and pelvic lymphodissection). One more criterion of including into the research was absence of active inflammatory process of urinary organs.

In each given case the following perioperative indices were analyzed: 1) operative time (minutes); 2) volume of intraoperative blood loss (ml, IBL); 3) time of urinary bladder draining by urethral catheter (BDUC, hours); 4) frequency of infectious and inflammatory complications (IIC) of genitourinary organs (GUO) in the early postoperative period (%); 5) time of hospital stay in postoperative period (number of hospital postoperative bed-days); 6) time of inducing spinal anaesthesia (SA) and endotracheal anaesthesia (GETA) (min.); 7) time of patient's waking up (min.) (this indicator was considered only in cases when simultaneous and mono interventions were performed using endotracheal anaesthesia).

Statistical analysis of the findings was carried out by using two-multiple choice two-sided t-test (a set of computer applied programs «Microsoft Excel 2010»). The variations were considered meaningful at $p \leq 0.05$.

Results of the research

Presents the findings about the time of performing simultaneous interventions compared to that of the corresponding mono-operations, considering only the duration of SO and MO from the start of manipulation to get a surgical access to the moment of suturing the wound (time of inducing anaesthesia (in case of SA and GETA) and time of patient's waking up (in case of GETA) will be considered later).

As seen in Table 3, in all the cases the time of SO was lower than the overall time of the similar isolated surgical interventions. For instance, performing simultaneous PCNL and transurethral cystolithotripsy (n=12) the intervention lasted 82.5 minutes (70-95 min) on average, whereas performing isolated PCNL (n=252) and transurethral cystolithotripsy (n=1056) required 63.9 (40-115) minutes and 40.3(15-60) minutes, correspondingly. Thus, the overall time of PCNL and transurethral cystolithotripsy performed separately was 104.2 (55-175) min-

utes, that is 20.8% longer than the time of the corresponding simultaneous operation ($p=0.0415$). We noted reduction of the time of two surgical interventions due to performing them in one surgical session for all the operations considered in this research. The time of SO was less than the overall time of the corresponding MO in case of simultaneous laparoscopic ureteroplasty and URSL (by 18.98%), PCNL and URSL (by 18.48%), laparoscopic kidney resection and TUR BT (by 17.44%), TURP and optic internal urethrotomy (by 13.43), TUR BT and PCNL (by 15.73%).

Those patients, who were performed TUR of prostate adenoma with TUR of bladder tumor or transurethral cystolithotripsy, were divided into additional subgroups depending on the size of the operated prostate. On simultaneous TUR of prostate adenoma and transurethral cystolithotripsy the time of SO reduced compared to the overall time of mono-operations by 7.50% in case of prostate size to 40 cm³, by 5.42% in case of prostate size to 60 cm³ and 9.52% in case of prostate size to 80 cm³. Similar results were received in cases of simultaneous TUR of prostate adenoma and TUR of bladder tumor: the time of intervention reduced by 5.57%, by 6.88% and by 9.22% in case of prostate size up to 40 cm³, 60 cm³ and 80 cm³, correspondingly.

The time of simultaneous optic internal ureterotomy and transurethral cystolithotripsy, RPE and phalloprosthesis, transurethral cystolithotripsy and URSL was less than the overall time of the corresponding mono-interventions by 0.44%, by 1.09% and by 2.79%.

Less volume of IBL during simultaneous interventions compared to that of mono-operations was noted for the following types of SO: 1) TUR of prostate adenoma and TUR of bladder tumor in case of performing them in one surgical session, the value of blood loss was lower than in cases of MO by 28.48%, by 24.48% and by 22.75% depending on the preoperative prostate size (to 40 cm³, to 60 cm³ and to 80 cm³, correspondingly); 2) ThULEP and TUR BT, getting the same results; 3) TUR BT and percutaneous nephrolithotripsy, in case of simultaneous intervention IBL was 11.46% less than during mono-operations.

For a number of endoscopic surgical mono-interventions, such as transurethral ureterolithotripsy, optic internal urethrotomy, transurethral cystolithotripsy, phalloprosthesis, volume of blood loss was not determined because of low hemoglobin concentration in lavage fluid and was taken as 0. While considering the simultaneous operations there was noted a decrease in the volume of blood loss compared to MO. The greatest difference (4.25%) was noted on performing TUR of prostate adenoma and transurethral cystolithotripsy in one surgical session, the least one (0.26%) – on performing simultaneous PCNL and transurethral cystolithotripsy.

On performing all the given interventions, both simultaneous and mono-operative, all the patients were introduced a urethral catheter. In all the cases of SO

we noted a considerable reduction of the time of draining the bladder (Table 5). For instance, in cases of performing transurethral resection of prostate adenoma or bladder tumor the time of urinary bladder draining was shorted by 45.9% for TUR BPH and TUR of bladder tumor (n=43), by 38.7% - TUR BPH and contact cystolithotripsy (n=92), by 47.9% - TUR BPH and URSL (n=16), by 47.4% - ThULEP and TUR of bladder tumor (n=15), by 53.8% - TUR of bladder tumor and URSL (n=16), by 55.8% - TUR of bladder tumor and PCNL (n=12).

This period was reduced a bit less on performing TUR of prostate adenoma and optic internal ureterotomy (n=16) – by 30.38%, optic internal ureterotomy and transurethral cystolithotripsy (n=18) – by 28.68%, laparoscopic RPE and phalloprosthesis (n=13) – by 23.71%.

It's necessary to focus on the time of draining the urinary bladder in TUR of prostate adenoma performed simultaneously with transurethral cystolithotripsy (n=92) or with TUR BT (n=43). Despite of the preoperative prostate size (to 40 cm³, to 60 cm³ or to 80 cm³), in each case we received a decrease of this index by 38.7% and by 45.9%, respectively.

As seen from the findings, simultaneous interventions are always much less associated with developing early IIC than isolated operations. For instance, on performing laparoscopic RPE and phalloprosthesis (n=10), as well as TUR of ureterocele and URSL (n=16) in one operative session, none of the cases had IIC whereas patients having only RPE or only URSL developed IIC in 5.50% and in 11.2% cases, correspondingly.

On performing simultaneous TUR of prostate adenoma and optic internal ureterotomy (n=16), optic internal ureterotomy and transurethral cystolithotripsy (n=18), TUR BT and PCNL (n=12), PCNL and transurethral cystolithotripsy (n=12), transurethral cystolithotripsy and URSL (n=13), TUR of prostate adenoma and URSL (n=16), ThULEP and TUR BT (n=15), TUR BT and URSL (n=16), TUR BN and transurethral cystolithotripsy (n=17), PCNL and URSL (n=12), laparoscopic ureterolithotomy and URSL (n=12), as well as other SO, frequency of IIC in the early postoperative period was less than the overall frequency of IIC after the corresponding isolated interventions.

The meaningful difference between the number of hospital bed-days after SO and their overall number after the corresponding mono-operations was 1.04 bed-days in favor of simultaneous interventions. Decrease of the index was the most marked in patients having simultaneous TUR of ureterocele and URSL (n=16) – by 54.55%, TUR of prostate adenoma (with the preoperative prostate size not more than 40 cm³) and TUR BT (n=12) – by 32%, TUR BT and PCNL (n=12) – by 50%, PCNL and transurethral cystolithotripsy (n=12) – by 40%; the least marked (reduction of the number of postoperative bed-days by 16.00%) – after TUR of prostate adenoma (with the preoperative prostate size not more than 60 cm³) and TUR BT (n=17).

On performing the considered surgical interventions, both simultaneous and isolated, there were used two kinds of anaesthesia techniques – spinal anaesthesia (SA) and general endotracheal anaesthesia (GETA). As shown in Table 8, in patients having SO using SA (n=352), the mean time of anaesthesia induction was 12.0 (6.9-17.7) minutes, that is twice less than the overall time of anaesthesia induction for the corresponding isolated interventions (24.3 (15.4-41.5)). This index decreased in the most degree on performing simultaneous ThULEP and TUR BT (by 59.34%, n=15) and optic internal ureterotomy combined with transurethral cystolithotripsy (by 58.30%, n=18); in the least degree – on performing simultaneous TUR BN and transurethral cystolithotripsy (by 39.83%, n=17), as well as TUR of prostate adenoma and URSL (by 37.82%, n=16).

General endotracheal anaesthesia was used on performing simultaneous interventions (TUR BT and URSL, TUR BT and PCNL, RPE and phalloprosthesis, laparoscopic kidney resection and TUR BT and others) in 130 patients, among which 118 patients (90.77%) had a shorter period of anaesthesia induction compared to the overall time of inducing anaesthesia on isolated operations. In these cases the difference between the values of the index for SO and mono-interventions was about 35.78% on performing laparoscopic kidney resection and TUR BT (n=10), 36.33% for RPE and phalloprosthesis (n=10), 38.19% for transurethral cystolithotripsy and URSL (n=17); 20.00% - for TUR BT and URSL, 26.38% - for laparoscopic ureteroplasty and URSL (n=13); for TUR BT and PCNL (n=12) - 9%; for PCNL and transurethral cystolithotripsy (n=12) – 15.7%; for laparoscopic ureterotomy and URSL (n=12) and TUR of ureterocele and URSL (n=16) – 13.7% and 18%, respectively. On performing simultaneous PCNL and URSL (n=12) the time of anaesthesia induction didn't differ from the overall time of anaesthesia induction for mono-operations.

where, SO – simultaneous operations; MO – mono-operations; TUR – transurethral resection; BPH – benign prostatic hyperplasia; URSL – ureterolithotripsy; PCNL – percutaneous nephrolithotripsy; P – adenoma prostate;

In all the patients having simultaneous interventions with GETA (n=130) the time of the waking up period from anaesthesia varied from 10.5 to 21.3 minutes (5-35 min.) and in each case it was statistically much less than the overall results of the similar counting on mono-operations (as seen from the findings in Table 9). For instance, the difference in favor of SO between the considered indices on simultaneous and two-staged radical prostatectomy and phalloprosthesis (n=10), TUR BT and URSL (n=16), TUR of ureterocele and URSL (n=16), laparoscopic ureterolithotomy and URSL was 37.54%, 35.98%, 33.53% and 33.48%, correspondingly. Stages of waking up from anaesthesia after combined transurethral resection of the urinary bladder and percutaneous nephrolithotripsy (n=12), per-

cutaneous nephrolithotripsy and ureterolithotripsy (n=12) were shorter than the overall time of waking up after isolated TUR BT and PCNL, PCNL and URSL by 30.81% and by 29.56%, correspondingly. The time of waking up period from simultaneous PCNL and transurethral cystolithotripsy (n=12), laparoscopic ureteroplasty and URSL (n=13), laparoscopic kidney resection and TUR BT (n=10) also reduced compared to the overall time of waking up from MO, though in a less degree – by 20.86%, by 17.39% and by 13.41%.

Thus, on performing planned operative treatment of combined kidney and urinary tracts diseases (simultaneously and separately), in cases of using simultaneous interventions there were registered better perioperative results than in cases of two-staged surgical treatment. These results were noted, firstly, in less duration of simultaneous operation in all the patients; secondly, in lower volume (to 32%) of intraoperative blood loss in 64.3% patients; thirdly, in reducing the time of the urinary bladder draining by the urethral catheter in 100% cases; fourthly, in less frequency of the early infectious and inflammatory complications of genitourinary organs in 100% patients (whereas after simultaneous TUR of ureterocele and URSL as well as RPE and phalloprosthesis they were not registered at all); fifthly, in reducing the number of postoperative bed-days in all the cases; sixthly, in reducing the time of spinal anaesthesia induction twice more in 100% patients; seventhly, in reducing the time of inducing general endotracheal anaesthesia in 90.77% cases and in reducing the waking up period from GETA in each case. It is evident that these advantages of SO over the corresponding mono-operations are quite important factors of improving the quality of surgical aid due to reducing the levels of operative traumatism and patients' negative psycho-emotional overstrain, lower risk of developing anaesthesiological and postoperative infectious and inflammatory complications, patients' earlier return to active life style, reducing financial expenses of both the patients and health care institutions.

Conclusion

The results of the research fully confirm the thesis of expediency, relevancy and necessity of wider using simultaneous intervention in cases of planned surgical treatment of combined urological diseases.

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居住在西伯利亚城乡患有龋齿的男性对缺氧的抵抗力
**RESISTANCE TO HYPOXIA OF URBAN AND RURAL MEN
LIVING IN SIBERIA WITH DENTAL CARIES**

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关联。地球上最常见的人类疾病之一是龋齿。尽管世界各国对不同年龄和性别人群的龋齿的病因、临床、诊断和预防进行了多方面的科学研究，但龋齿对人体（包括人类）抵抗缺氧能力的影响问题仍然存在。生活在西伯利亚的第一个成年期的情况尚未得到充分研究。目的：评估西伯利亚城市和农村地区首次成年龋齿患者的耐缺氧能力。材料与方法。对居住在秋明市（46 人）和秋明地区各县（37 人）的两组患有龋齿的初成熟期男性进行了检查。研究了：肺活量；根据 Stange 和 Gench 测试，身体对缺氧的抵抗力；Stange 测试期间意志努力的持续时间；计算1分钟内的呼吸周期数；胸部游览；在相等的 15 秒时间间隔内对肺活量进行五倍测量的值（罗森塔尔试验）；健康水平（根据 R.M. Baevsky 的说法，适应潜力）。在评估龋齿对牙齿的损害程度时，采用了世界卫生组织推荐的指标。结果与讨论。农村男性对缺氧的抵抗力高于城市男性。结论。农村地区男性的肺活量、吸气和呼气时任意屏气的持续时间以及斯坦格测试期间的意志力在统计上比城市居民更显著。生活在农村地区的男性每分钟的呼吸周期数明显较少，而且他们的胸部偏移也明显较高。Stange、Gench 和 Rosenthal 测试可以评估身体的功能状态及其对缺氧的抵抗力，这在大规模检查的条件下非常重要。计算出的适应潜力值证明，生活在农村地区的男性的身体对环境条件有更好的适应能力。

关键词：居住地区、男性、龋齿、耐缺氧能力。

Relevance. *One of the most common human diseases on earth is dental caries. Despite the multifaceted scientific research on the etiology, clinic, diagnosis and prevention of caries in various age and sex groups of the population*

of the countries of the world, the question of the effect of dental caries on the body's resistance to hypoxia, including in people of the first adulthood living in Siberia, has not been sufficiently studied. **Objective:** to assess the resistance to hypoxia of persons of the first adulthood with dental caries living in cities and rural areas of Siberia. **Material and methods.** Two groups of men of the period of the first mature age, living in the city of Tyumen (46 people) and districts of the Tyumen region (37 people), with dental caries, were examined. There were studied: vital capacity of the lungs; body resistance to hypoxia according to the Stange and Gench tests; the duration of volitional effort during the Stange test; counting the number of respiratory cycles in 1 minute; chest excursions; the value of a five-fold measurement of the vital capacity of the lungs for equal 15 s time intervals (Rosenthal test); level of health (adaptive potential according to R.M. Baevsky). When assessing the degree of damage to the teeth by caries, the indicators recommended by the World Health Organization were used. **Results and discussion.** The resistance to hypoxia of men living in rural areas is higher than that of their urban peers. **Conclusions.** The vital capacity of the lungs, the duration of arbitrary breath holding on inhalation and exhalation, and volitional effort during the Stange test in men living in rural areas are statistically more significant than in urban residents. The number of respiratory cycles per minute is significantly less in men living in rural areas, and their chest excursions are also significantly higher. The Stange, Gench and Rosenthal tests make it possible to assess the functional state of the body and its resistance to hypoxia, which is important in the conditions of mass examinations. The calculated values of the adaptive potential testified to the better adaptation of the body of men living in rural areas to environmental conditions.

Keywords: region of residence, men, dental caries, resistance to hypoxia.

Relevance. One of the most common human diseases on earth is dental caries [15, 16, 17, 18, 19]. Despite significant advances in the diagnosis, clinic, treatment and prevention of dental caries, the problem of its study remains relevant [2, 6, 14]. Specialists have not ignored the study of the prevalence and intensity of dental caries in modern residents of cities and rural areas of various ages and genders [11, 13].

Despite the large-scale attention to the problem of dental caries, the issues of its influence on the activity of the functional systems of the male body, including the function of external respiration, remain in the shadows to date. Among the methodological techniques that allow assessing the functional adaptive capabilities of the human body, an important place is occupied by functional tests of the cardiorespiratory system [9, 10.]. The functions of external respiration and the body's resistance to hypoxia are subject to study [5, 8]. Scientific studies of the

harsh climate of Siberia [12], where a significant part of the Russian population lives, and its impact on human life are well known [1, 4]. Successful development of the natural resources of the North of Siberia, which has a colossal economic potential, is inextricably linked with the problems of human adaptation to environmental conditions. As for the function of external respiration and resistance to hypoxia in men of the first mature age, with dental caries, living in cities and rural areas of Siberia, in particular in the city of Tyumen, we did not find such works in the literature available to us, which was the motivation for carrying out research.

Purpose: to evaluate the resistance to hypoxia of men of the first adulthood with dental caries living in cities and rural areas of Siberia.

Material and methods. In the medical center “Astra-Med” in Tyumen, 83 male volunteers of the first adulthood with dental caries were examined, divided into two groups depending on the region of residence. The first group included men living in Tyumen (46 people, 26.3 ± 2.8 years old), the second group included men living in rural areas of the Tyumen region (37 people, 28.2 ± 2.5 years old). The studies were carried out in the morning hours (from 9 to 11), before the start of active activities. The adaptive potential was calculated before the tests with arbitrary cessation of external respiration. Pulmonary function studies were performed in the sitting position using a nose clip.

Studied: vital capacity of the lungs (VCL, ml); resistance of the organism to hypoxia according to the standard tests of Stange (c) and Gench (c); duration of volitional effort during the Stange test (s); the number of respiratory cycles in 1 minute; chest excursions (EGC, cm); values of a fivefold measurement of VCL for equal 15 s time intervals (Rosenthal test). The measurement of VCL was carried out with a Spiro-Spectrum spirometer manufactured by Neurosoft. To calculate the level of health (adaptive potential (AP) according to R.M. Baevsky), the equation [3] was used: $AP = 0.011(HR) - 0.014(SBP) + 0.008(DBP) + 0.014(B) - 0.009(BW) - 0.009(P) - 0.27$

where: AP is the adaptive potential of the circulatory system in points, HR is the pulse rate (bpm); SBP and DBP - systolic and diastolic blood pressure (mm Hg); BW – body weight (kg); H – height (body length, cm); A - age (years).

Individual values of AP were distributed according to 4 degrees: satisfactory adaptation - 1.50 - 2.59 points; tension of the mechanisms of the activity of the cardiovascular system - from 2.60 to 3.09 points; unsatisfactory adaptation - 3.10 to 3.60 points; disruption of adaptation mechanisms - from 3.61 or more points.

When assessing the degree of damage to the teeth by caries, the recommendations of the World Health Organization were used.

The results of the study were processed statistically [7] using the Microsoft Excel software, while the reliability of the results obtained was assessed using the nonparametric Mann-Whitney U-test for comparing small samples and using

the paired Student's t-test for dependent populations, considering the differences significant at $p < 0.05$.

The "Rules of Clinical Practice in the Russian Federation" (Order of the Ministry of Health of the Russian Federation No. 226 dated June 19, 2003), as well as the principles of voluntariness, individual rights and freedoms guaranteed by Articles 21.2 and 22.1 of the Constitution of the Russian Federation, were observed. Oral consent of men for the study was obtained.

Results and discussion. In scientific research, one of the main indicators characterizing the functional capabilities of the human external respiratory system is VCL. VCL depends on the blood supply to the lungs, the development of the muscles of the chest and trunk, the condition of the diaphragm, posture, violations of which can lead to a decrease in VCL.

Comparison of VCL in men living in the city of Tyumen and rural areas (Table 1) indicated that in rural men VCL in absolute terms was higher by 370 ml, although there were no significant differences ($p > 0.05$).

Table 1
External respiration function and adaptive potential in men, urban and rural residents (M±m)

Index	City (n = 46)	Village (n = 37)
VCL	3.950±0.250	4.320±0.225
Stange test	52.8±3.6	61.4±3.7*
Duration of volitional effort during the Stange test	18.4±2.3	25.6±2.8*
Gencha test	34.6±2.2	39.9±2.4*
Counting the number of breaths in 1 minute	18.4±1.3	15.2±1.4*
Excursions of the chest	4.4±0.3	6.7±0.4*
Rosenthal test	1. 4.050±0.240	1. 4.320±0.215
	2. 4.050±0.250	2. 4.320±0.220
	3. 4.000±0.260	3. 4.330±0.245
	4. 3.970±0.240	4. 4.340±0.230
	5. 3.970±0.250	5. 4.330±0.225
Adaptive potential	2.08±0.11	1.81±0.13*

Note: * - differences are significant at $p < 0.05$ according to the non-parametric Mann-Whitney U-test.

At present, there is no clear quantitative assessment of the results of the Stange test depending on gender, age, region of residence, type of constitution, etc. There is only an indication that the duration of arbitrary breath holding in persons with a normal degree of physical fitness is 40-60 seconds and can vary significantly, taking into account the individual characteristics of the body.

In the Stange test, two phases are distinguished: the first (before the onset of uncoordinated contractions of the diaphragm) indicates the sensitivity of the respiratory center to humoral factors. The second (before the resumption of breathing) - allows you to judge the volitional inhibition of breathing. In our study, the second phase was shorter in duration than the first and was 18.4 ± 2.2 s in urban men and 25.6 ± 2.5 s in rural men. We assess this result as an insufficient willpower of urban men during the test. It can be assumed that men of the period of the first mature age living in rural areas have formed a more economical breathing pattern.

Comparison of the results of using the standard Gencha test in urban and rural men indicated that the duration of voluntary breath holding on exhalation in rural men was statistically significantly longer ($p < 0.05$). In absolute terms, this delay was 5.3 s longer than in urban men. If we proceed from the fact that arbitrary breath holding on exhalation with a duration of less than 34 seconds is assessed as unsatisfactory, 35–39 seconds as satisfactory, and more than 40 seconds as good, then we can conclude that all the men we examined had a satisfactory breath holding in time. on the exhale.

We found significant differences ($p < 0.05$) when comparing the frequency of respiratory cycles between urban and rural men. It was found that in men of the period of the first adulthood living in rural areas, the frequency of respiratory movements per minute was 3.2 times less than in urban men. We associate the decrease in the frequency of respiratory movements in rural men with an increase in the volume of inhaled air, the value of which was evidenced by the calculation of the EGC index, which is the difference in the circumference of the chest during inhalation and exhalation (with $EGC < 4$ cm - low, 5-9 cm - medium and > 10 - high). In men living in rural areas, EGCs were significantly higher ($p < 0.05$) in comparison with men living in Tyumen, while the difference in absolute values was 2.3 cm.

Assessing the results of the Rosenthal test, we note that in rural men, VC at each of the 5 stages of measurement in absolute terms was higher than in urban men, although we did not obtain significant differences ($p > 0.05$). After the first measurement of VC in absolute values, it was higher in men living in rural areas by 0.270 ml, the second and subsequent measurements, respectively, by 0.270 ml, 0.330 ml, 0.360 ml and 0.360 ml. It can be concluded that all the men examined by us had no respiratory pathology.

The study of the level of AP according to Baevsky showed, firstly, that it is in the range of 1.50 - 2.59 points, corresponding to the values of “satisfactory adaptation” characteristic of healthy people. Secondly, AP is significantly ($p < 0.05$) lower in men living in rural areas.

The results of the study allow us to draw the following conclusions:

1. The vital capacity of the lungs, the duration of arbitrary breath holding on inhalation and exhalation, and volitional effort during the Stange test in men living

in rural areas are statistically more significant than in urban residents. The number of respiratory cycles per minute is significantly less in men living in rural areas, and their chest excursions are also significantly higher, which indicates a good level of non-specific adaptive capabilities of the body.

2. The Stange, Gench and Rosenthal tests are methodologically simple and valid, they allow an objective and quick assessment of the functional state of the body and its resistance to hypoxia, which is important in the conditions of mass examinations.

3. Calculated values of the adaptive potential according to the method of R.M. Baevsky testified to the best adaptation of the body of men living in rural areas to the conditions of the external environment.

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

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

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体能训练对老年人心理生理指标的影响

**THE INFLUENCE OF PHYSICAL TRAINING ON THE
PSYCHOPHYSIOLOGICAL PERFORMANCE INDICATORS OF
ELDERLY PEOPLE**

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抽象的。本文介绍了参与和不参与体力活动的老年人的心理生理参数(例如简单和复杂的感觉运动反应)的比较研究结果。对180人的数据进行了分析,其中一些人经常从事体育和娱乐活动,第二部分则不然。该研究分几个阶段进行:第一阶段对两个研究组进行输入诊断,之后第一组定期进行体力活动6个月,然后进行最终诊断。研究结果显示,受测组的感觉运动反应指数存在统计学上的显著差异。从统计数据来看,从事体力活动的人的感觉运动反应时间显著少于不参加体力活动的人。根据结果可以得出结论,体力活动会影响老年心理生理特征的保存和神经系统的性能。这在复杂的感觉运动反应的指标中尤其明显,特别是选择反应。研究的下一个任务是确定影响参与体力活动的人身体工作能力持续时间的最重要的生活因素(训练方案、心理态度等)。

关键词: 体力活动、老年、心理生理参数、感觉运动反应、标准差。

Abstract. *The article presents the results of a comparative study of psychophysiological parameters, such as simple and complex sensorimotor reactions, of elderly people involved and not engaged in physical activity. The data of 180 people were analyzed, some of which are regularly engaged in a sports and recreation complex, the second part is not. The study was conducted in several stages: at the first stage, the input diagnostics of both studied groups was carried out, after which the first group was regularly engaged in physical activity for 6 months, then the final diagnostics was carried out. The results of the study showed a statistically significant difference in the indices of sensorimotor*

reactions of the examined groups. The time of sensorimotor reactions in people who are engaged in physical activity is statistically significantly less than in those who are not. Based on the results, it can be concluded that physical activity affects the preservation of psychophysiological characteristics in old age, the performance of the nervous system. This is especially evident in the indicators of a complex sensorimotor reaction, in particular, the reaction of choice. The next task of the study is to establish the most significant life factors (training regimen, psychological attitudes, etc.) that affect the duration of the body's working capacity of people involved in physical activity.

Keywords: *physical activity, old age, psychophysiological parameters, sensorimotor reactions, standard deviation.*

Active longevity and maintaining health requires each of us to maintain physical fitness, especially important in the light of solving this problem, age-appropriate systematic physical activity in pre-retirement and old age. The main direction of physical activity during this period is to maintain the tone of skeletal muscles and functional systems within the upper limits of the age norm [2,6].

With age, the symptoms of age-related changes manifest themselves and are expressed in mental fatigue, limited range of interests, passivity. As a rule, these manifestations of mental decline in the elderly (decrease in the mobility of mental processes, increased frequency of depressive states) are interconnected with the factor of the decline of physical health [1,5]. Therefore, engaging in various types of physical activity contributes to strengthening not only physical, but also mental health, activation of mental functions in old age [3, 4].

The purpose of our study was to study the characteristics of the psychophysiological state of the elderly people involved in physical activity, in comparison with the characteristics of people who are not involved.

The study¹ involved 180 people aged 60 to 65 years. The first group regularly engages in various types of physical activity: Nordic walking, swimming, yoga. The second group does not engage in organized physical activity.

Based on a study of the literature, the following methods were chosen as the most informative methods for studying the psychophysiological state of the elderly: a simple visual-motor reaction (SVMR), a choice reaction (CR) as a complex sensorimotor reaction (CSMR). The parameters of the SVMR and CSMR describe the neurodynamic processes in the central nervous system, i.e. excitability of the cortical part of the visual analyzer and the rate of transmission of excitation in the

¹ The study was carried out within the framework of the topic “Determining the informative parameters of the psycho-functional-metabolic potential of the elderly as the basis of a telemedicine monitoring and consulting system for the population, designed to personalize the preservation of the quality of life and ensure active longevity” of the program of strategic academic leadership “Priority 2030”

reflex arc (including effectors). The time between the initiation of a signal and the response of the body is an indicator of the functional state of the central nervous system, since this time is used for the transmission and processing of information in the higher parts of the brain. Thus, sensorimotor reactions are an indicator of a person’s working capacity, the functional state of his nervous system as a regulator of life, and therefore they can also serve as an indicator of a person’s adaptive capabilities, including those associated with age-related changes.

To register the parameters of sensorimotor reactions, a set of equipment from Neurosoft was used. At each stage, a survey was conducted according to the SVMR and Strelka (RT) methods from the Psychotest kit.

The study consisted of several stages. At the first stage, the input diagnostics of elderly people aged 60-65 years old, who are engaged in physical activity on the basis of the recreational complex “Meshchersky”, Nizhny Novgorod (n=94 people) and not involved in physical activity (n= 86 people), was carried out. Then the first group was engaged in organized physical activity 2 times a week for 6 months. Class attendance was recorded by FOK trainers. At the last stage, the final diagnosis was carried out.

Table 1

The results of indicators of sensorimotor reactions of elderly people involved and not engaged in physical activity

Indicator, (method), units	Me		p based on the Wilcoxon W test
	Input diagnostics of persons involved in	Input diagnostics of persons NOT involved in	
Average value of reaction time, (SVMR), ms	254,7	277,01	0,004**
Standard deviation, (SVMR), c.u.	48,25	74,96	0.001**
Average reaction time, (RT), ms	471,16	543,28	0,001**
Standard deviation, (RT), c.u.	100,05	99,19	0,361

For data analysis, methods of mathematical statistics were used, in particular, the Wilcoxon W-test (Table 1). Comparison of input diagnostics data on indicators of sensorimotor reactions of elderly people who are engaged and not engaged in regular physical activity (Table 1) showed that the time of sensorimotor reactions is statistically significantly different: older people who are engaged in physical activity respond faster to stimuli than those who do not ($p < 0.01$). The standard deviation indicates the spread of the values of the studied quantity relative to the

median. A statistically significant change in this indicator indicates the heterogeneity of indicators for individuals within the study group. This fact also indirectly proves the influence of physical activity on the performance of people in old age.

Table 2

The results of indicators of sensorimotor reactions of elderly people involved in physical activity in dynamics

Indicator, (method), units	Me		p based on the Wilcoxon W test
	Input Diagnostics	Final diagnostics	
Average value of reaction time, (SVMR), ms	254,7	276,48	0,001**
Standard deviation, (SVMR), c.u.	48,25	67,34	0.001**
Average reaction time, (RT), ms	471,16	507,7	0,001**
Standard deviation, (RT), c.u.	100,05	90,07	0,014**

The data presented in Table 2 show that over time, all indicators of sensorimotor reactions in the elderly change statistically significantly. The time of both a simple sensorimotor reaction and a complex one increases. Standard deviation indicators also change. Statistically significant change in this indicator ($p < 0.01$) indicates an increase in the heterogeneity of indicators after 6 months of physical activity. That is, if we see an increase in the reaction time indicator, then we cannot say that all subjects equally experience an increase in reaction time, because the spread of values increases statistically significantly. First of all, this is due to the peculiarities of the age of the subjects (there were age-related changes in the body), their difference in health status (this study did not take into account the nosology of chronic diseases). Accordingly, based on the results obtained, it can be stated that the reaction time indicators in the group of elderly people involved in physical activity decrease non-uniformly: some people experience this decrease, while others do not, which means that regular physical activity contributes to the preservation of mental functions (sensory-motor reactions) in elderly people to varying degrees.

Table 3

Comparison of indicators of sensorimotor reactions of elderly people involved in physical activity, according to the results of the final diagnosis and those not involved in

Indicator, (method), units	Me		p based on the Wilcoxon W test
	Input diagnostics of persons involved in	Input diagnostics of persons NOT involved in	
Average value of reaction time, (SVMR), ms	276,48	277,01	0,707
Standard deviation, (SVMR), c.u.	67,34	74,96	0,361
Average reaction time, (RT), ms	507,7	543,28	0,024*
Standard deviation, (RT), c.u.	90,07	99,19	0,05*

Comparison of the results of the study of a group of elderly people involved in physical activity at the end of the experiment, after 6 months of regular exercise with the initial data of the group not involved (Table 3), showed statistically significant differences in the choice reaction (SVMR). The reaction time of a simple visual-motor reaction is almost the same. This indicates a slowdown in the aging process in people involved in physical activity. This is especially evident in complex sensorimotor reactions, because the reaction time is much shorter in the first group of subjects.

The obtained results of observing the comparison and dynamics of psychophysiological characteristics lead us to the conclusion that in the process of aging of the body, a person has a deterioration in physical condition, psychophysiological parameters of the dynamic spectrum, but physical activity can help preserve these functions. The next task of the study is to identify specific factors, predictors of the physical state, features of the quality of life, psychological attitudes, features of the mode of organization of physical activity of the elderly, which in a special way affect the preservation of the working capacity of the nervous system, the functional state of a person for as long as possible.

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晚期早产儿脑缺血长期后果的预后标志物

THE PROGNOSTIC MARKERS OF LONG-TERM CONSEQUENCES OF CEREBRAL ISCHEMIA IN LATE PREMATURE INFANTS

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抽象的。早产是国际上的一个重大公共卫生问题，影响着全世界 1300 万婴儿。缺氧和缺血可能是早产儿获得性脑损伤最常见的类型。早产幸存者缺氧缺血性损伤的临床表现包括一系列脑瘫和智力障碍。该研究的目的是根据精神运动发育谱的生物电活动和大脑结构特征的变化，确定晚期早产儿脑缺血长期后果的预后标志物。晚期早产儿出生时平均体重一般组为 2195 ± 301 g，对照组为 2426 ± 301 g。一般组中最多的是2期脑缺血——51名(46.4%)儿童，1期脑缺血49名(45.5%)儿童，最少的是3期脑缺血——10名(8.1%)患者。一般组中脑缺血指数与脑部超声标志物(胼胝体变薄)之间的相关性为 $r = -0.6$ ($p = 0.05$)，这就是为什么该方法可以用作确定严重程度的筛查方法 早产儿晚期的脑损伤。在分析脑部脑电图变化与脑缺血严重程度的相关性时发现，早产儿晚期功能性脑损伤的深度和严重程度与脑缺血严重程度有很强的相关性($r = 0.74$; $p = 0.05$)。脑缺血。脑缺血远期后果的预测应基于对晚期早产儿精神运动发育程度的动态评估，并根据主要标志物规划新生儿期的动态观察。

关键词: 脑缺血、脑电图、早产儿、神经病理学、ADHD、预后标志物。

Abstract. *Premature birth is a major public health issue internationally affecting 13 million babies worldwide. Hypoxia and ischemia is probably the commonest type of acquired brain damage in preterm infants. The clinical manifestations of hypoxic-ischemic injury in survivors of premature birth include*

a spectrum of cerebral palsy and intellectual disabilities. The purpose of the study is determination the prognostic markers of long-term consequences of cerebral ischemia in late premature newborns based on changes in bioelectric activity and structural features of the brain in accordance with the spectrum of psychomotor development. The average body weight of late premature newborns at birth is 2195 ± 301 g in general group and 2426 ± 301 g – in control group. The predominant number in general group was with stage 2 cerebral ischemia – in 51 (46.4%) children, stage 1 cerebral ischemia was diagnosed in 49 (45.5%) children, the smallest number was with stage 3 cerebral ischemia – 10 (8.1%) patients. The correlations in the general group between the cerebral ischemia index and the brain ultrasound marker (thinning of the corpus callosum) were $-r=0.6$ ($p=0.05$), which is why this method can be used as a screening method in determining the severity of brain damage in late premature newborns. When analyzing the correlations of EEG changes in the brain and the severity of cerebral ischemia, it was found that the depth and severity of functional brain damage in late premature newborns had a strong relationship ($r=0.74$; $p=0.05$) with the severity of cerebral ischemia. The prediction of the long-term consequences of cerebral ischemia should be based on a dynamic assessment of the degree of psychomotor development of late premature infants and the dynamics of observation should be planned in the neonatal period according to the main markers.

Keywords: cerebral ischemia, EEG, premature infants, neurological pathology, ADHD, prognostic markers.

Introduction

Currently, the consequences of cerebral ischemia occupy a leading place in the structure of neurological pathology in children and are the main cause of early disability and premature mortality [1]. Worldwide, about 11.1% of babies are born annually before 37 weeks of gestational age. In the Russian Federation in 2018, according to the Federal State Statistics Service, the proportion of premature babies among all children born during this period was 5.6% [2]. Delayed motor and mental development occurs in 40% of premature infants who have undergone cerebral ischemia [3]. The world statistics of the occurrence of cerebral ischemia in premature infants varies from 1.3-5.9:1000 newborns [4]. According to literature data, over the past ten years, the number of premature babies has increased by 25% of the total number of newborns, among them late premature newborns account for 84% [5].

In accordance with the international classification of premature babies, according to gestational age, there are very premature babies (very preterm) - born at a gestation period of less than 32 weeks, moderate premature babies (moderate preterm) - from 32 to 33 weeks and late premature babies (late preterm) - born at a gestation period of 34 to 36 weeks [6].

The clinical picture, diagnosis and early rehabilitation of the effects of cerebral ischemia in late premature newborns are not well studied. Therefore, it is necessary to develop timely diagnostic and corrective measures of psychomotor disorders for the prevention of neurological disability and mortality. To date, there are no purposeful systematic studies in the scientific literature and in clinical practice to identify markers for predicting the long-term effects of cerebral ischemia in late premature newborns and on observation of this group of children, according to the peculiarities of their psychomotor development and adaptive potential [7].

The purpose of the study is determination the prognostic markers of long-term consequences of cerebral ischemia in late premature newborns based on changes in bioelectric activity and structural features of the brain in accordance with the spectrum of psychomotor development.

Material and methods

Investigation was from 2018 to 2022 in Crimean Children Hospital. The 200 late premature newborns were examined, of which, after a thorough analysis of compliance with the inclusion criteria and the absence of exclusion criteria, the 110 late premature infants with cerebral ischemia were included in the study. The study did not include patients with intrauterine development delay; children born at less than 34 weeks and more than 36 weeks; with congenital malformations and with hereditary diseases of various genesis. The control group was represented by 90 late premature newborns without signs of cerebral ischemia and other concomitant pathology.

Based on the goals and objectives of the study, the following research methods were used: general clinical examination; instrumental and functional (USD and EEG) and psychiatric children scale, statistical analysis of the data obtained.

The studies were conducted in accordance with international moral and ethical standards and the provisions of the Helsinki Declaration (June 1964, as amended in 2013), the International Code of Medical Ethics (1983), comply with the requirements of Good Laboratory Practice (GLP) [8], as well as the legislation of the Russian Federation.

The 200 late premature newborns aged 1 month of life were examined, taking into account postgestation age, 1 year, 2 years and 3 years of life, among which 110 newborns with cerebral ischemia made up the general group and 90 healthy late premature newborns – the control group. A late premature baby is a newborn whose gestation period at birth was from 34 to 36 weeks inclusive. According to the design of the study, the selection of patients was carried out on the basis of compliance with the inclusion/exclusion criteria

Criteria for inclusion in the study: children born at the gestation period of 34, 35, 36 weeks; cerebral ischemia of varying severity on the scale of H.B. Sarnat and M.S. Sarnat [9]; children who did not receive prosthetics of the respiratory

function of artificial ventilation; absence of signs of the current infectious process; absence of concomitant pathology. Exclusion criteria: children born at gestation less than 34 weeks and more than 36 weeks; the presence of intrauterine development delay; the presence of congenital malformations; the presence of hereditary diseases of various genesis. Before inclusion in the study, patients were divided into three subgroups by gestation period: 34, 35, 36 weeks. The control group consisted of children who were born at the age of 34-36 weeks, without cerebral ischemia and central nervous system pathology. The children from control group were in the maternity hospital on a joint stay with their mothers.

Results

According to gestation age, the distribution of children is homogeneous: 34 weeks (n=38;n=30); 35 weeks (n=32;n=29); 36 weeks (n=40; n=31) general and control groups respectively. The average body weight of late premature newborns at birth is 2195 ± 301 g in general group and 2426 ± 301 g – in control group. According to H.B. Sarnat and M.S. Sarnat, the predominant number in general group was with stage 2 cerebral ischemia – in 51 (46.4%) children, stage 1 cerebral ischemia was diagnosed in 49 (45.5%) children, the smallest number was with stage 3 cerebral ischemia – 10 (8.1%) patients.

When analyzing the brain ultrasound investigation data after birth in children who underwent cerebral ischemia, there was a decrease in the corpus callosum in length and width. The length of the corpus callosum is normal: at the gestation period of 34 weeks, it was 50 mm, the body thickness was 1 mm, the knee thickness was 2 mm; at the gestation period of 35 weeks, the length was 52 mm, the body thickness was 2 mm, the knee was 3 mm; at the gestation period of 36 weeks, the length was 54 mm, body thickness – 3 mm, knee – 4 mm. In control group, normal parameters of the corpus callosum were observed in 50 (56%) children. Thinning of the corpus callosum (characterized at 34 weeks: length – 25 ± 1.7 mm, body thickness – 0.5 ± 0.3 mm, knee thickness – 1 ± 1.1 mm; at 35 weeks, the length was – 26 ± 1.7 mm, body thickness – 1 ± 1.2 mm, knee – 1.5 ± 1.7 mm; at the age of at 36 weeks gestation, the length was 27 ± 1.7 mm, the body thickness was 1.5 ± 1.3 mm, the knee was 2 ± 1.5 mm) in general group was observed in 59 (54%) children and in control group - in 39 (44%) patients. The second place among brain ultrasound markers was occupied by ventricular dilatation, which was characterized by ventricular expansion.

The correlations in the general group between the cerebral ischemia index and the brain ultrasound marker (thinning of the corpus callosum) were - $r=0.6$ ($p=0.05$), which is why this method can be used as a screening method in determining the severity of brain damage in late premature newborns. Among the EEG markers, the presence of: flashes of θ -waves in the occipital regions in general group – in 46 (42%) children, in control group – in 16 (18%) patients; frontal acute

transient waves in general group – in 33 (30%) patients, in control group – in 24 (27%) children; δ -brushes in parietal areas in general group – in 30 (28%) children, in control group – in 10 (12%) patients.

At the age of three, late premature infants had hyperkinetic disorders (F90.1) - in 35 (31.8%) children in general group and in 25 (27.7%) patients in control group ($p < 0.05$); delayed speech development (F80.1, F80.2) – in general group – 32 (29.1%) of children, in control group - in 22 (24.4%) patients ($p < 0.05$); motor disorders (G25.8) - in 12 (10.9%) children in general group, in 8 (8.8%) examined in control group ($p < 0.05$); sleep disorders (G47.0) – in 13 (11.8%) children in general group and in 10 (11%) patients in control group ($p < 0.05$). It should be noted that in general group - 18 (16.4%) children and in control group - 25 (27.8%) patients were not registered at the dispensary, but had behavioral characteristics. To determine the diagnostic value of the research methods in the neonatal period, the correlations between the brain ultrasound and EEG markers that were obtained in the neonatal period and the long-term effects of cerebral ischemia diagnosed at the end of the third year of life were evaluated [9,12].

The strongest correlations were observed between the data of functional research methods with Attention deficit hyperactivity disorder (ADHD): brain ultrasound marker (thinning of the corpus callosum) - $r = 0.58$, $p < 0.05$; EEG marker (flashes of θ -waves in the occipital regions) - $r = 0.74$, $p < 0.05$, which showed prognostic reliability in the early diagnosis of ADHD. Similar reliable associations of functional research methods with ADHD were noted in control group: brain ultrasound marker (thinning of the corpus callosum) - $r = 0.52$, $p < 0.05$; EEG marker (frontal acute transient waves) - $r = 0.68$, $p < 0.05$, which indicated the presence of pathological changes in the brain in late premature newborns without a pathological clinical picture [13].

Discussion

At the age of three, a number of diseases were observed in late premature infants: hyperkinetic disorders (F90.1) - in 35 (31.8%) children in general group and in 25 (27.7%) patients in control group ($p < 0.05$); delayed speech development (F80.1, F80.2) – in general group – in 32 (29.1%) children, in control group - in 22 (24.4%) patients ($p < 0.05$); motor disorders (G25.8) - in 12 (10.9%) children in general group, in 8 (8.8%) examined in control group ($p < 0.05$); sleep disorders (G47.0) – in 13 (11.8%) children in general group and in 10 (11%) patients in control group ($p < 0.05$). It should be noted that in general group - 18 (16.4%) and in control group - 25 (27.8%) children were not registered at the dispensary, but had behavioral characteristics. The data obtained correspond to the results of a study by Einspieler C. et al. (2017), which respectively showed that late premature newborns have consequences perinatal brain lesion with hyperexcitability syndrome, in the form of eating disorders and sleep-wake rhythm [10]. The data obtained

form an idea of the behavioral phenotype of late premature infants who underwent cerebral ischemia, in which attention problems prevailed in 26 (23.6%) children, and emotional reactivity in 24 (21.8%) children; in children without cerebral ischemia, in whose behavior anxiety prevailed in 20 (22%) children and isolation – in 15 (16.7%) of the surveyed. The main symptoms of ADHD significantly prevailed in children from general group, compared with the symptoms in patients from control group ($p < 0.05$). When comparing the severity of cerebral ischemia in the neonatal period and the long-term consequences obtained in late premature infants, a heterogeneous distribution of morbidity was obtained. With grade I of cerebral ischemia, 18 (16.5%) children without pathology were observed, hyperkinetic disorders were in 12 (10.9%) children and delayed speech development in 19 (17.3%) children. Hyperkinetic disorders were observed in 23 (20.9%) children in children who underwent grade II of cerebral ischemia, speech development delay – in 10 (9.1%), motor disorders - in 5 (4.5%) and sleep disorders – in 13 (11.8%) children. With grade III of cerebral ischemia, motor disorders were observed in 7 (6.4%), delayed speech development in 3 (2.7%) children. It should be noted that the delay in speech development among other long-term consequences of cerebral ischemia was present at all degrees of severity of cerebral ischemia in late premature newborns. When analyzing the degree of reliability of diagnostic markers for GW subgroups, the presence of reliable indicators for children born at 34 weeks of gestation was noted, the correlation with the main markers was the following indicators: with thinning of the corpus callosum ($r = 0.6$; $p < 0.05$), with the presence of flashes of θ -waves in the occipital regions ($r = 0.7$; $p < 0.05$). In the subgroups of late premature infants of 35 and 36 weeks in gestation age, correlations of the severity of cerebral ischemia with the main markers of neuroimaging and functional methods were: with ventricular dilation ($r = 0.4$; $p < 0.05$ and $r = 0.5$; $p < 0.05$), with frontal acute transient waves ($r = 0.6$; $p < 0.05$ and $r = 0.7$; $p < 0.05$), respectively. These indicators indicated that neurophysiological markers have the highest sensitivity than neuroimaging markers and reliability is characteristic of the subgroup of 34 weeks of gestation. Alkan H. et al. (2021) noted that the severity of cerebral ischemia correlates with the severity of brain damage according to the brain ultrasound classification. Particularly noteworthy is the high diagnostic sensitivity of the classification, which determined changes in the morphological picture of the brain in the group of late premature newborns without clinical manifestations of cerebral ischemia [11, 14]. However, the data are generalized in nature, without indicating the specifics of the damage. In turn, according to the EEG study, data were obtained that demonstrated the degree of functional maturity of the brain and damage caused by cerebral ischemia. Palchik A.B. et al (2021) demonstrated that the severity of cerebral ischemia correlates with the severity of brain damage according to serious neurological consequences [15].

Conclusion

The prediction of the long-term consequences of cerebral ischemia should be based on a dynamic assessment of the degree of psychomotor development of late premature infants and the dynamics of observation should be planned in the neonatal period according to the main markers. Assisting children with psychomotor, cognitive and behavioral disorders is a comprehensive and individual approach, combining non-drug and drug methods. In the complex rehabilitation of any disturbed spheres of life of preschool and school age children, the main efforts of all specialists are aimed at correcting the intellectual deficit that disrupts communication and education of children. Not only timely diagnosis of cognitive disorders, but also assessment of the level of compensatory capabilities, adequate medical and psychological assistance significantly reduce the degree of psycho-emotional discomfort, increase the social capabilities of the child in terms of learning, psychological contact.

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对秋明患有过敏性鼻炎的第二个童年时期的男孩进行 ASCHNER-DAGNINI 测试
**ASCHNER-DAGNINI TEST IN BOYS OF THE SECOND
CHILDHOOD PERIOD, TYUMEN, SUFFERING ALLERGIC
RINITIS**

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抽象的。在秋明州的 Astra-Med 医疗中心,为了按年龄评估自主神经系统对心血管系统活动的影响,106 名男孩在第二个童年(8-12 岁)患有过敏症 检查鼻炎(AR)。为此,我们使用了我们修改过的 Aschner-Dagnini 检验。研究表明,86.8% 的男孩在眼球压力停止后立即检测到阳性(正常)类型的眼心反射,而迷走神经型和交感神经紧张型眼心反射则不太常见。 研究结果可用于儿科实践。

关键词: 男孩, 过敏性鼻炎, Aschner-Dagnini 试验。

Abstract. *At the Astra-Med medical center in Tyumen, for the purpose of age-specific assessment of the influence of the autonomic nervous system on the activity of the cardiovascular system, 106 boys during their second childhood (8-12 years old) suffering from allergic rhinitis (AR) were examined. For this purpose, we used the Aschner-Dagnini test modified by us. It was shown that in 86.8% of boys, immediately after the pressure on the eyeball ceases, a positive (normal) type of the eye-heart reflex is detected, while vagotonic and sympathicotonic types of the*

eye-heart reflex are much less common. The results of the study can be used in pediatric practice.

Keywords: *boys, allergic rhinitis, Aschner-Dagnini test.*

The relevance of research. The international consensus developed by leading scientists of the European Academy of Allergy and Clinical Immunology (2001) proposes to interpret allergic rhinitis (AR) as a chronic disease of the nasal mucosa, which is based on Ig-mediated allergic inflammation caused by exposure to various allergens and manifested by a complex of symptoms in the form of rhinorrhea, nasal congestion, sneezing and itching in the nasal cavity.

In recent years, allergic diseases, and AR in particular, as a problem have become of great importance due to the high increase in their prevalence among the population (from 10 to 40%), especially in the pediatric population [2, 3, 4, 7, 11, 13].

In the USA, about 30 million people suffer from AR, in England AR is diagnosed in 16% of the population, in Denmark - 19%, in Germany - from 13 to 17%. The prevalence of AR in children in Russia is up to 34% in different regions and is increasing from year to year [1, 5, 6, 8, 9].

AR symptoms affect school attendance, and allergies are one of the leading causes of school absence. Thus, in the USA, it is associated with more than 2 million missed school days [10, 12]. Children with insufficiently controlled AR have reduced learning ability, which affects their school activities [10, 18]. Children with AR may be more irritable and more tired, inattentive and have difficulty concentrating in class [14, 16, 17].

Allergic rhinitis causes significant financial costs. Thus, the annual costs associated with the diagnosis and treatment of patients with AR amount to 1.5-2 billion euros in Europe, and indirect costs - 1.5-2 billion euros; in the USA, direct costs amount to \$5.6 billion [15].

Depending on the characteristics of the course and exacerbations of AR associated with the time of year in children, year-round and seasonal forms of the disease are distinguished.

Seasonal AR is associated with exposure to pollen allergens and occurs during certain flowering periods of trees and grasses. Allergens can be pollen from trees (birch, oak, alder, elm, maple, poplar), grasses (timothy, fescue, brome, foxtail, bluegrass, rye) and weeds (quinoa, wormwood, ragweed), as well as molds. Features of seasonal rhinitis are the frequency of exacerbations.

Year-round AR is caused by allergens from house dust, cockroach mites, rodents, and some types of mold fungi. Depending on the severity of clinical manifestations, the following forms of the disease are distinguished:

- mild: there are only minor clinical manifestations that do not interfere with daytime activity and/or sleep, the patient is aware of the presence of manifestations of the disease, but can do without treatment;

- moderate: symptoms of rhinitis disrupt sleep, interfere with work, study, and sports, the quality of life deteriorates significantly;

- severe: symptoms are so severe that the patient is unable to work, study, play sports or leisure activities during the day, or sleep at night unless treated.

In the literature available to us, we have not found studies showing the effect of the Aschner-Dagnini test to assess the excitability of the parasympathetic part of the autonomic nervous system in boys of the second childhood period suffering from AR of varying severity of clinical manifestations. The sample (test) was proposed in 1908 by the Italian doctor G. Dagnini (1866...1928) and the Austrian gynecologist B. Aschner (1883...1960) and currently bears their name.

The question of methods for studying the autonomic nervous system in children, including the period of second childhood, suffering from AR, remains very relevant today. But, despite the importance and complexity of the problem, it did not receive its resolution.

Purpose of the study: to evaluate the excitability of the parasympathetic part of the autonomic nervous system in boys during their second childhood in Tyumen, suffering from allergic rhinitis of varying severity.

Material and research methods. At the “Astra-Med” medical center in Tyumen, 106 boys in their second childhood (8-12 years old) suffering from AR of varying severity were examined. At the age of 8 years there were 16 people, 9 years old – 20, 10 years old – 23, 11 years old – 25, 12 years old – 22 boys. All boys are residents of Tyumen and study in secondary schools in the city. Depending on the characteristics of the course and exacerbations of AR associated with the time of year, we identified both year-round (in 31 - 29.4%) and seasonal (in 75 - 70.6%) forms of the disease.

The standard Aschner-Dagnini test (eye-heart reflex) consists of moderate and uniform pressure on the eyeballs after 3-4 deep breaths and holding the breath. At the height of inhalation, we applied pressure with our fingers on the boys' closed eyes for 3-4 seconds. With the classic test method, heart rate is counted 1 minute before pressing and 1 minute after pressing on the eyeball. The sample results were assessed as follows.

- The normal type of ocular-heart reflex is a slowdown of the pulse by 4-10 beats/min.
- Vagotonic type of oculo-cardiac reflex – slowing of the pulse by more than 10 beats/min.
- Sympathicotonic type of ocular-heart reflex – increased heart rate.

We modified the test technique - heart rate was calculated not only within a minute after the pressure on the eyeball stopped, but also over the next 15 minutes. In this case, the pulse was counted for the first and last 10 seconds of each minute of the study.

The studies complied with the ethical standards of the biomedical ethics committees, developed in accordance with the Declaration of Helsinki adopted by the WMA, as well as Order of the Ministry of Health of the Russian Federation No. 226 of June 19, 2003, "Rules for clinical practice in the Russian Federation." All boys, as well as their parents, consented to the examination.

Research results and discussion.

The reflex was induced by moderate pressure with the thumb and forefinger on the lateral areas of the eyeball with the eyelids closed for 20 seconds. The study established (Table 1) that one minute after the pressure on the eyeball ceases, the normal type of ocular-heart reflex, i.e. heart rate slowing by 4-10 beats/min, occurred in 92 (86.8%) boys

Table 1
Types of responses of the cardiovascular system to the Danini-Aschner test after 1 minute and over the next 15 minutes

Types of reactions	Age, years				
	8	9	10	11	12
In one minute					
Normal – heart rate slows down by 4-10 beats/min.	16	19	18	18	21
Sharply positive – heart rate slows down by more than 10 beats/min.	1	2	1	3	3
Negative – no change in heart rate.	–	–	–	–	–
Pervverted – increased heart rate by 2-4 beats/min.	–	–	1	1	2
In 15 minutes					
Normal – heart rate slows down by 4-12 beats/min.	17	20	19	21	24
Sharply positive – heart rate slows down by more than 10 beats/min.	–	1	1	1	2
Negative – no change in heart rate.	–	–	–	–	–
Pervverted – increased heart rate by 2-4 beats/min.	–	–	–	–	–

The vagotonic type of oculocardiac reflex, in which the pulse slowed down by more than 10 beats/min, was detected in 10 (9.43%) boys. The sympatheticotonic type of oculocardiac reflex, in which the heart rate increased by 2-4 beats, was diagnosed in 4 boys (3.77%), starting at the age of 10 years.

15 minutes after the pressure on the eyeball ceased, a positive type of oculo-cardiac reflex was diagnosed in 8-year-old boys. At the same time, it is alarming that 5 boys aged 9, 10, 11 and 12 years old continued to have a sharply positive reaction, in which the heart rate slowed down by more than 10 beats/min.

Conclusions:

1. In 86.8% of boys of the second childhood period suffering from allergic rhinitis, immediately after the cessation of pressure on the eyeball, a positive (normal) type of eye-heart reflex is detected. Vagotonic and sympathicotonic types of the oculo-cardiac reflex are much less common.
2. It is impossible to judge the prevalence of excitability of the sympathetic or parasympathetic division of the autonomic nervous system by the oculo-cardiac reflex alone. It should be taken into account that the excitability of the trigeminal nerve also plays a certain role in the mechanism of its origin.
3. The study of reflexes of the autonomic nervous system during allergic rhinitis allows the ENT doctor to more adequately approach the diagnosis and treatment of patients with this pathology.

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特殊形式的四次曲线和四次曲面
QUARTIC CURVES AND QUARTIC SURFACES OF A SPECIAL
FORM

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抽象的。这项工作属于解析几何、物理和化学中的几何方法领域，致力于研究一类特殊类型的四阶曲线和曲面。本文包含笛卡尔坐标系中所考虑的曲线和曲面类型的隐式和显式方程。然后，利用获得的公式，对各个氢原子之间化学键随时间形成的过程进行了数学建模。因此，这些类型的曲线和曲面的重要性通过氢分子形成的成功建模的例子得到了证明。

关键词：四次曲线、四次表面、氢分子、原子间距离、化学键、玻尔半径。

Abstract. *This work belongs to the areas of analytical geometry, geometric methods in physics and chemistry and is devoted to the study of a special type of curves and surfaces of the fourth order. The paper contains equations of the considered types of curves and surfaces in the Cartesian coordinate system in implicit and explicit forms. Then, using the obtained formulas, mathematical modeling of the process of formation of a chemical bond between individual hydrogen atoms over time was carried out. Thus, the significance of these types of curves and surfaces is demonstrated by the example of successful modeling of the formation of a hydrogen molecule.*

Keywords: *quartic curve, quartic surface, molecular hydrogen, interatomic distances, chemical bond, Bohr radius.*

Introduction

Consider a fourth degree equation written in a Cartesian coordinate system:

$$(4x^2 + 4y^2)^2 - 8(r_0 + k(1 - t))^2(x^2 - y^2) = d^4 - 2(r_0 + k(1 - t))^2 d^2, \quad (1)$$

where r_0, k, d - some positive parameters, the variable t plays the role of time and conditionally varies from 0 to 1: $0 \leq t \leq 1$.

Having made the substitution in formula (1), $r_0(t) = r_0 + k(1 - t)$, we obtain:

$$(4x^2 + 4y^2)^2 - 8r_0(t)^2(x^2 - y^2) = d^4 - 2r_0(t)^2d^2. \quad (2)$$

Equation (2) is the equation of a fourth-order curve [1], written in implicit form. Curves of the fourth order occupy an important place in analytic geometry, since some remarkable curves belong to this class of curves [2]. In explicit form, equation (2) will be written in the form:

$$y = \pm \sqrt{\sqrt{d^4/16 - r_0(t)^2 d^2/8 + r_0(t)^4/16 + r_0(t)^2 x^2} - x^2 - r_0(t)^2/4}. \quad (3)$$

Now let's move from the plane to the volume. In three-dimensional space, the equation of the corresponding fourth-order surface [3] in the Cartesian coordinate system can be written as

$$x^2 + y^2 + z^2 + \frac{r_0(t)^2}{4} = \sqrt{d^4/16 - r_0(t)^2 d^2/8 + r_0(t)^4/16 + r_0(t)^2 x^2}. \quad (4)$$

Squaring both sides of equation (4), we get:

$$(x^2 + y^2 + z^2 + \frac{r_0(t)^2}{4})^2 = d^4/16 - r_0(t)^2 d^2/8 + r_0(t)^4/16 + r_0(t)^2 x^2. \quad (5)$$

Indeed, with applicate $z=0$, the section of this fourth-order surface by the XOY plane will be a fourth-order curve (2). In explicit form, equation (4) can be written as:

$$z = \pm \sqrt{\sqrt{d^4/16 - r_0(t)^2 d^2/8 + r_0(t)^4/16 + r_0(t)^2 x^2} - x^2 - y^2 - \frac{r_0(t)^2}{4}}. \quad (6)$$

Let us demonstrate the significance of this type of curves and surfaces on a specific problem related to the fields of mathematical physics and mathematical chemistry.

Mathematical modeling of the formation of a hydrogen molecule when hydrogen atoms approach each other up to the chemical bond distance

The hydrogen molecule is the simplest diatomic molecule with a covalent non-polar bond [4]. As a quantum mechanical system, the hydrogen molecule is described in a rather simplified way [5], since the exact solution of the wave equation for systems with more than one electron presents insurmountable mathematical difficulties. Only the dissociation energy of a molecule [6], as well as the inter-nuclear distance [7], are known with sufficient accuracy. The dimensions of the hydrogen molecule are not known accurately enough; the effective diameter of a hydrogen molecule is estimated in different scientific works in different ways (even in calculations by the same method, which uses the mean free path of the molecule [8]). One of the simplest models that does not take into account the statistical interpretation of the wave function is the Bohr model of the hydrogen molecule [9]. Let us carry out mathematical modeling of the process of formation of a molecule when individual hydrogen atoms approach each other up to the chemical bond distance. For the effective size of the hydrogen molecule, we take the value of 2.8 Å, which is often found in the scientific literature [10]. When hydrogen

atoms approach each other to the chemical bond distance between the proton of one atom and the electron of another atom, the Coulomb attraction forces begin to act [11], as a result of which the electron clouds of atoms are deformed and the process of formation of a chemical bond begins

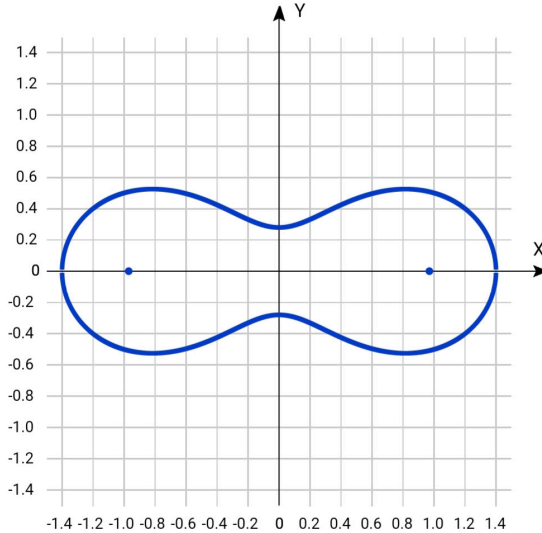


Figure 1.

Consider a plane curve in a rectangular Cartesian coordinate system (abscissa and ordinate axes) given by an implicit fourth-degree equation:

$$(4x^2 + 4y^2)^2 - 8r_0^2(x^2 - y^2) = d^4 - 2r_0^2 d^2, \tag{7}$$

where $r_0 = 0,74\text{\AA}$ - internuclear distance in a hydrogen molecule, $d = 2,8\text{\AA}$ - is the diameter of the molecule.

This fourth-order curve models the geometrical parameters of an already formed hydrogen molecule. To simulate the process of formation of a molecule over time, it is necessary to replace the internuclear distance in formula (7) r_0 with a function $r_0(t)$, depending on time as follows:

$$r_0(t) = r_0 + 1,2(1 - t), \tag{8}$$

where the time t conditionally varies from 0 to 1: $0 \leq t \leq 1$. The factor $k=1,2$ in formula (8) was selected empirically.

Taking into account function (8), equation (7) takes the form:

$$(4x^2 + 4y^2)^2 - 8(r_0 + 1,2(1 - t))^2(x^2 - y^2) = d^4 - 2(r_0 + 1,2(1 - t))^2 d^2. \tag{9}$$

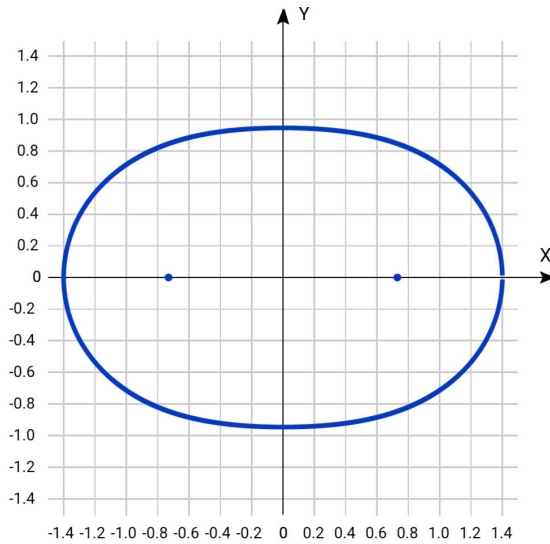


Figure 2.

At the initial moment of time at $t = 0$, the sizes of the hydrogen atoms entering into the bond are almost equal to the Bohr radius $a_0 = 0,53\text{\AA}$ [12]. At $t = 1$ the process of chemical bond formation is completed and the molecule acquires a stable shape and effective diameter $d = 2,8\text{\AA}$, and the distance between protons becomes equal $r_0 = 0,74\text{\AA}$. Figures 1, 2 and 3 show the stages of the formation of a hydrogen molecule at the values of the conditional time $t=0$; $t=0.4$ and $t=1$, respectively. Dots represent protons, their coordinates

$$P_1(0; -r_0(t)/2) \text{ and } P_2(0; r_0(t)/2). \tag{10}$$

Curves (7) and (9) can also be written explicitly:

$$y = \pm \sqrt{d^4/16 - r_0^2 d^2/8 + r_0^4/16 + r_0^2 x^2 - x^2 - r_0^2/4} \tag{11}$$

$$y = \pm \sqrt{d^4/16 - r_0(t)^2 d^2/8 + r_0(t)^4/16 + r_0(t)^2 x^2 - x^2 - r_0(t)^2/4} \tag{12}$$

It should be noted that the obtained curves, which are the boundaries of the common electron cloud (Figures 1,2,3), are very similar to the lines of equal electric charge density in a hydrogen molecule, obtained by completely different methods [13].

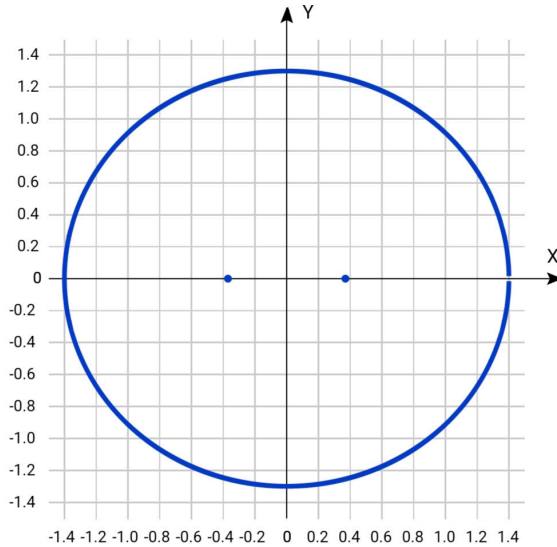


Figure 3.

Let’s move from the plane to the volume. In three-dimensional space, the equation of the corresponding fourth-order surface is written as

$$x^2 + y^2 + z^2 + \frac{r_0^2}{4} = \sqrt{d^4/16 - r_0^2 d^2/8 + r_0^4/16 + r_0^2 x^2}. \tag{13}$$

Taking into account the passage of time, equation (13) will be written in the form:

$$x^2 + y^2 + z^2 + \frac{r_0(t)^2}{4} = \sqrt{d^4/16 - r_0(t)^2 d^2/8 + r_0(t)^4/16 + r_0(t)^2 x^2}. \tag{14}$$

When squaring both parts of expressions (13) and (14), we get:

$$\left(x^2 + y^2 + z^2 + \frac{r_0^2}{4}\right)^2 = d^4/16 - r_0^2 d^2/8 + r_0^4/16 + r_0^2 x^2; \tag{15}$$

$$\left(x^2 + y^2 + z^2 + \frac{r_0(t)^2}{4}\right)^2 = d^4/16 - r_0(t)^2 d^2/8 + r_0(t)^4/16 + r_0(t)^2 x^2. \tag{16}$$

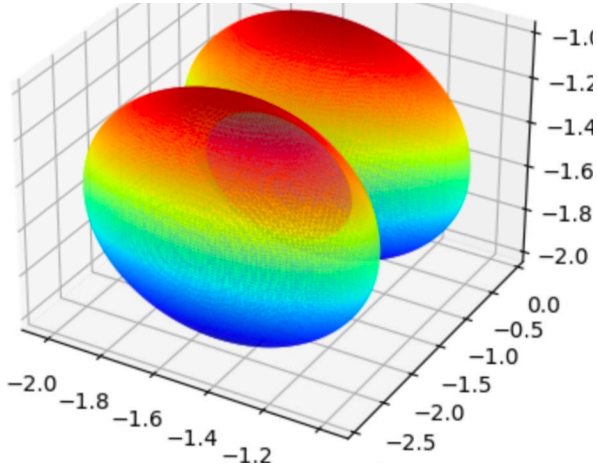


Figure 4.

Figures 4, 5 and 6 show the stages of formation of a hydrogen molecule for the conditional time $t=0$; $t=0.4$ and $t=1$, respectively, in three-dimensional space.

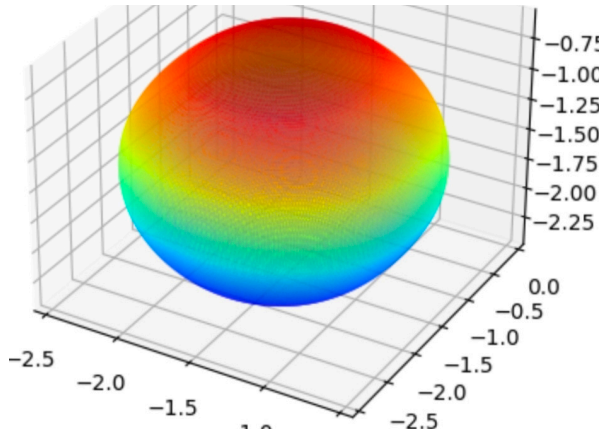


Figure 5.

The performed mathematical modeling of the process of formation of a hydrogen molecule testifies to the special significance of the points $P_1(0; -r_0(t)/2)$ and $P_2(0; r_0(t)/2)$ and for the studied type of fourth-order curves. Let us conventionally call these points the cores of the curve (2).

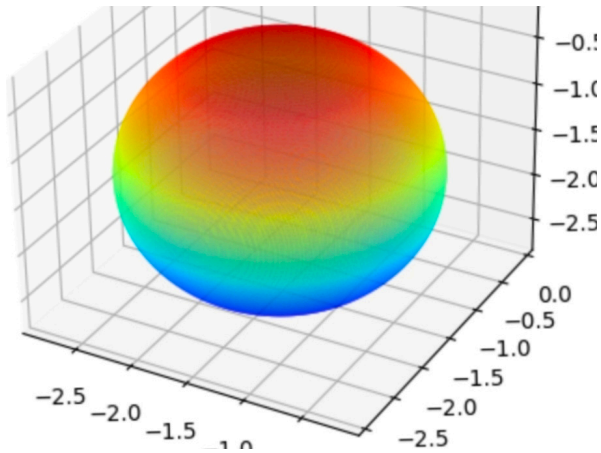


Figure 6.

For other values of the effective diameter of the hydrogen molecule, the considered curves and fourth-order surfaces can also be written, having undergone appropriate changes. For example, the following selection of the probability density function for the detection of electrons in a hydrogen molecule is successful:

$$p(x) = \frac{5^6 \cdot 2}{3^3 \pi^{7/2}} x^2 e^{-(25x/(3\pi))^2} \tag{17}$$

This function is very similar to the Maxwell distribution (which describes the statistical behavior of the parameters of ideal gas particles [14]), satisfies the normalization condition [15], and has extremum points [16] $x_{max} = \pm 0,377; x_{min} = 0$. Thus, the maximum points of the probability density correspond to the radius of the electron torus in the Bohr model of the hydrogen atom, and the minimum point is located exactly in the middle of the segment connecting the protons (where the so-called “Coulomb hole” is located). Having made the equation

$$\int_{-d/2}^{d/2} \frac{5^6 \cdot 2}{3^3 \pi^{7/2}} x^2 e^{-(25x/(3\pi))^2} dx = 0,99, \tag{18}$$

where d – the effective diameter of the hydrogen molecule, within which electrons can be detected with a probability of 0.99, we obtain the value of the effective diameter of the molecule $d=1.8\text{\AA}$.

Conclusion

Thus, in this paper, special types of curves and surfaces of the fourth order are considered. Using the formulas of these curves and surfaces, mathematical modeling of the formation of a hydrogen molecule from individual hydrogen atoms was carried out, which demonstrated the significance of these curves and surfaces. The special role of two points for the considered type of curves, conventionally called

kernels, is shown. Graphs of the stages of the formation of a hydrogen molecule in the plane and volume are plotted.

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使用 INNOJECT PRO 疫苗接种机器人监控有效的疫苗接种
**MONITORING EFFECTIVE VACCINE ADMINISTRATION BY
USING THE INNOJECT PRO VACCINATION ROBOT**

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注解。 控制了通过颈部皮下注射对日龄肉鸡疫苗溶液的有效施用, 以及使用 INNOJECT PRO 疫苗接种机器人在生产孵化场进行眼部喷雾疫苗接种。 由于其精确性和简单性, 该设备可以在几乎不需要操作员协助的情况下对日龄肉鸡进行无差错和精确的疫苗接种。

关键词: 疫苗接种; 日龄肉鸡; 生产孵化器; 疫苗有效输送控制。

Annotation. *The effective administration of vaccine solution on day-old broiler chickens by subcutaneous injection in the neck area and spray vaccination ocularly on a production hatchery by using the INNOJECT PRO vaccination robot was controlled. Thanks to its precision and simplicity, this device performs error-free and precise vaccination of day-old broiler chicks with little operator assistance.*

Keywords: *vaccination, day old broiler chicken, production incubator, control of the effective delivery of the vaccine.*

Introduction. Poultry farming is one of the important branches of agriculture in our country, specializing in the production of poultry meat, edible eggs, and down (feather) [1]. One of the major stages in the life of poultry is vaccination of poultry stock, which is the process of introducing antigenic compounds or vaccines into the body to create immunity to a particular disease [2]. Broiler vaccination programs are an important tool for the prevention of diseases, especially viral diseases. Vaccines induce the formation of an immune response in birds to protect them from field infection [4]. In production hatcheries, day-old chicks are vaccinated by different methods: spray method, intraocular injection, subcutaneous injection.

Objective of the study. To achieve control of effective vaccine administration on day-old broiler chicks in a production hatchery by using the INNOJECT PRO vaccination robot.

Object of study. The object of the study is vaccinated day-old broiler chicks, and the INNOJECT PRO vaccination robot was used as vaccine delivery.

Research results. The INNOJECT PRO vaccination robot (Figure 1.) allows simultaneous vaccination of the chick by two subcutaneous injections in the neck area and one spray vaccination ocularly or orally. Thanks to its precision and simplicity, this machine allows for high standardization of vaccination, low incidence of vaccine ineffectiveness, high hourly productivity and maximum operator safety with attention to animal welfare.



Figure 1. INNOJECT PRO vaccination robot (photograph of the device).

The eye and nasal drop system carefully delivers a very precise dose through the chicks' eye canals and nostrils at the same time as the subcutaneous vaccination process. By limiting movement and lifting of chicks, virtually eliminates the risk of injury or missed dose. The least number of moving parts increases the safety of both chicks and operator. INNOJECT PRO was designed to improve animal welfare by helping to ensure gentle, safe and stress-free handling of chicks during the vaccination process. Along with gentle handling, accurate vaccine administration can effectively eliminate the stress of vaccination. INNOJECT PRO is also equipped with a unique disinfection system that sprays disinfectant on injection needles between vaccinations, helping to improve biosecurity and reduce contamination. In addition, thanks to the ability to connect to the hatchery network via Wi-Fi or Bluetooth, information about the vaccination process can be directly integrated into the hatchery's data management system to optimize performance.

Vaccination process: the operator takes two chicks and inserts them into the prepared slots of the machine with the direction of the chicks head forward (Figure 2). When the robot sees the chick, it clamps the chick with the clamping device and automatically the laser finds the eye and injects the vaccine solution (Figure

3), and at the same second the subcutaneous injection is carried out in the neck area (Figure 4). After successful vaccination, the robot unclamps the clamping device and the chicks move down the tray to the prepared box for vaccinated broiler chicks (Figure 5). In order to make sure that the qualitative effect of vaccine delivery is realized, we can take any vaccinated chicken and make sure of it (Figure 6; Figure 7).



Figure 2. Fixing chicks in prepared grooves of the apparatus with the head of the chicks forward.

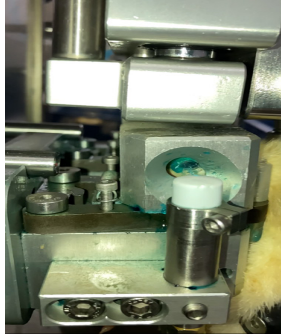


Figure 3. Spray vaccination ocularly.



Figure 4. Subcutaneous injection in the neck region.



Figure 5. Unclamping the clamping device and moving the chicks down the tray into the prepared crate.

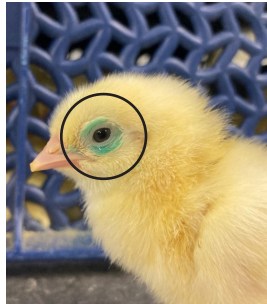


Figure 6. Final visual inspection of vaccine solution delivery by ocular spray vaccination method.



Figure 7. Final visual inspection of vaccine solution delivery by subcutaneous injection in the neck region.

Spray vaccination by the ocular method is performed against such viral diseases as “Infectious bronchitis of chickens” and “Newcastle disease”. The subcutaneous injection method in the neck area is used against the viral disease “Infectious Gumboro disease” [3].

Conclusions: In summary, the following results were obtained as a result of conducting effective vaccine administration on day-old broiler chicks at the production hatchery by using the INNOJECT PRO vaccination robot. Due to its precision and simplicity, this device, with little operator assistance, performs an error-free simultaneous vaccination of two chicks by subcutaneous injection in the neck area and ocular spray vaccination.

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