



SCIENTIFIC RESEARCH OF THE SCO COUNTRIES: SYNERGY AND INTEGRATION

上合组织国家的科学研究：协同和一体化

Proceedings of the
International Conference

Date:
April 26

Beijing, China 2024

上合组织国家的科学研究：协同和一体化
国际会议

参与者的英文报告

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

Part 2

2024 年 4 月 26 日。中国北京
April 26, 2024. Beijing, PRC

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

(April 26, 2024. Beijing, PRC)

ISBN 978-5-905695-82-7

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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ISBN 978-5-905695-82-7

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如何识别有能力在某些运动中取得创纪录成绩的个人
**HOW TO IDENTIFY INDIVIDUALS WITH THE ABILITY TO
ACHIEVE RECORD ACHIEVEMENTS IN CERTAIN SPORTS**

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注解。提出了一种识别具有在体育领域成功运作能力的个人的独创方法。用于识别表征人格特征的有限指标子集的系统程序已得到实质性证实。已经确定的是,使用所提出的方法可以估计每个选定指标的信息“权重”。

关键词: 独创方法论、能力拥有、体育活动、意义评估。

Annotation. *An original method for identifying individuals with the ability to successfully operate in the field of sports is proposed. The systematic procedure for identifying a limited subset of indicators that characterize personality characteristics is substantively substantiated. It has been established that the use of the proposed method makes it possible to estimate the information “weight” of each of the selected indicators.*

Keywords: *original methodology, possession of abilities, sports activity, assessment of significance.*

Introduction. It is known that for outstanding achievements in any sport, an athlete must have not only a number of specific values of various physical indicators (mass, time, strength, length), characteristic specifically for this sport, but also specific values of biological, pedagogical, psychological, medical, sociological indicators directly related to the athlete’s activities [1]. Moreover, in addition to measuring length, height, time, mass and other physical quantities, in sports it is necessary to evaluate technical skill, expressiveness and artistry of movements and similar non-physical quantities [2].

[Note 1. Depending on the type of sport, the values of many medical and pedagogical indicators can have a very significant spread. Thus, the difference in the relative volume of the heart in different sports differs by almost 2 times, and the

specific volume of blood (ml) is more than 1.5 times; a significant difference is also found when assessing general physical performance even among athletes in speed-strength and team sports [1].]

The measured and controlled parameters in sports medicine, the training process and scientific research in physical culture and sports include: *physiological (“internal”), physical (“external”) and psychological parameters of training load and recovery; *parameters of the qualities of strength, speed, endurance, flexibility and agility; *functional parameters of the cardiovascular and respiratory systems; *biomechanical parameters of sports equipment; *body size parameters (see [1-8] and a number of other works).

However, despite the *efforts of coaches who are clearly interested in selecting future champions and prize-winners at world-class competitions, *experienced doctors with an adequate specialization for the sport in question, *taking into account many different indicators, *active and intensive training of individuals (individuals) caught in team of representatives of a particular sport, the results of their participation in major international competitions are not always successful. Although, at the same time, some individual athletes achieve record achievements, oddly enough, almost regularly, for several years.

Why is this happening? One can only assume that those who repeatedly, not by chance, but regularly win world championships, have some differences in the values of some physical, biological, psychophysiological, ... indicators (or differences in the genome). Therefore, all that remains is to try to discover, isolate these indicators and compare their values among outstanding athletes and among ordinary citizens of the same age. And if the difference in the value of some indicators turns out to be very significant, statistically significant, then taking into account this circumstance, carry out targeted selection into sports sections of a given sport.

The article attempts to create a universal methodology that allows us to identify individuals who have the ability to achieve record achievements in a particular sport and become successful, outstanding athletes. The technique is based on a number of previously tested algorithms (see, for example, [9-12]).

1. Expert identification and ranking by coaches and sports doctors of indicators that are decisive for a given sport.

At this stage, it is necessary to identify a group of indicators, the values of which together characterize the athlete’s ability to take prizes at world championships in a particular sport. Both coaches and doctors should participate in the formation of a list of such indicators. It is assumed that two databases have been created, one of which contains, for each sport, information about coaches who have trained several athletes over the past 10 years who have become prize-winners at national and/or world championships, and the second - information about doctors specializing in sports. medical and pedagogical supervision (in the same sports) and work experience of at least 5-7 years..

Let us assume that coaches are the first to create a list of defining indicators in the sport chosen by the researcher. The proposed algorithm includes the following steps.

Step 1.1. Using a table or random number sensor from a database containing information about the best coaches, potential participants in the examination are selected to identify and subsequently organize the indicators that have the most significant impact on the athlete’s success.

Step 1.2. Expert trainers who agreed to participate in the survey are assigned identifiers (also using a random number sensor). Let us assume that there were 100 people who agreed to participate in the examination.

[Note 2: Both steps are performed automatically, i.e. not only the participants, but also the organizers of the examination do not know who exactly is participating in the surveys, who justified their decision and how, how groupings of survey participants arise]

Step 1.3. Each participant in the expert survey is informed of the need to list the indicators that, in the opinion of the expert coach, have a major impact on the athlete’s future successes, and to rank (order) the listed indicators according to their degree of importance.

[Note 3. The need to perform not only the selection of defining indicators, but also their ranking, forces most expert trainers to be more careful in choosing a subset of the required factors]

Step 1.4. Each expert leaves no more than 15-16 factors in the lists of selected and ordered factors.

As a result of step 1.4, a table like table 1 will be generated.

[Note 4. Experts whose lists included indicators selected by no more than 10-20 percent of those participating in the examination (in Table 1 these are indicators X2, Xj, Xj+k) are asked to explain the reasons for choosing these particular indicators, and with explanations are introduced to all experts, offering, if desired, to change their previous rankings].

Table 1

Results of the examination on the formation of a limited subset of indicators that, according to survey participants, is decisive

Expert trainer	It is these indicators, according to survey participants, that have the main influence on an athlete’s success at International competitions								
	X1	X2	...	Xj	Xj+1	...	X j+k	...	Xm
Z ₁	1	1	...	1	1	...	0	...	1
Z ₂	0	0	...	0	1	...	1	...	0
Z ₃	1	1	...	1	1	...	0	...	0
...

Z_i	0	1	...	0	0	...	0	...	1
...
$\sum X_j$	92	eleven	...	3	97	...	2	...	95

Step 1.5. Processing the results of the examination after survey participants familiarize themselves with the explanations provided in support of widely differing answers, and each participant re-selects and ranks the indicators $X_j(jCm)$. Formation of a complete list of indicators identified by coaches. A similar sequence of steps is performed when interviewing doctors specializing in medical and pedagogical control in a given sport.

2. Identification of a subset of indicators whose values among outstanding athletes differ significantly from the values among ordinary citizens

Now it is necessary to determine which specific indicators of outstanding athletes differ from the values of the same indicators of ordinary citizens. After all, it is quite possible that the presence of such indicator values in an athlete has a decisive influence on his success and increases the likelihood of him achieving record results in a particular sport. To detect such differences, the values of indicators from the lists highlighted by both coaches and doctors in paragraph 1, as well as quantitative values and/or expert assessments of other indicators borrowed from athletes who have repeatedly won prizes at world championships in this sport, are assessed from various sources (in addition to works [1-8]).

Lists of the same indicators and their values are also generated for another group of individuals - a group of ordinary citizens.

Step 2.1. The values of each indicator in the combined lists of outstanding athletes and ordinary individuals are converted into relative units (relative to the average value of the indicator)

Step 2.2. Sorting in descending order of the relative values of each indicator according to the joint lists of athletes and individuals.

Step 2.3. Dividing into deciles the values for each indicator of the entire sorted set of indicators.

Step 2.4. In Table 2, in the rows of athletes and ordinary citizens whose indicator values fell into the first or last deciles, one is put in the indicator columns, and if the indicator value falls within the interdecile range, a zero is put (see Table 2).

Table 2.

The relative values of indicators falling into the first or last deciles (among athletes and ordinary citizens) are marked with the number 1.

Outstanding athletes and ordinary citizens	1 – relative values of the indicator fell into the first or last deciles. 0 - relative values of the indicator fall within the interdecile range								
	Y1	Y2	...	Yj	Yj+1	...	Y j+k	...	Ym
Athletes									
Z_1	1	1	...	1	1	...	0	...	1
Z_2	0	0	...	0	1	...	1	...	0
Z_3	1	1	...	1	1	...	0	...	1
...
Ordinary citizens									
Z_i	0	0	...	0	0	...	1	...	0
Z_{i+1}	0	1	...	0	0	...	1	...	0
...

Step 2.5. Grouping all Z_i ($i \in n$) by degree of significance (see [9-15]) using the method “Comparative assessment of the functional completeness and significance of objects and their characteristics (functions, features, factors, indicators).” If ordinary citizens were also included in the group with outstanding athletes, then, apparently, these citizens could potentially be among the successful athletes.

Step 2.6. Assessment of the significance (information “weight”) of each of the selected indicators (after transposing Table 2). It is possible that in the future, it would be advisable to support individuals with high significance (“weight”) of the selected indicators (after research and assessment of the level of their real capabilities to achieve record achievements in a given sport) if they wish to actively train and represent the sport of high achievements.

Conclusion

1. An original method for identifying individuals with the ability to successfully operate in the field of sports is proposed. It can be assumed that with the development of scientific and technological progress, indicators will be discovered that will make it possible to quickly identify and purposefully train individuals who have extraordinary abilities in certain sports for successful performances at world championships

2. The systematic procedure for identifying a limited subset of indicators that characterize personality traits, which are subjective conditions for the successful implementation of a certain type of activity - activity in the field of sports, is substantively justified.

3. It has been established that the use of the method “Comparative assessment of the functional completeness and significance of objects and their characteristics” makes it possible to evaluate the information “weight” of each of the selected indicators (“personality characteristics”), provides the opportunity to identify individuals who have the ability to achieve record results in a certain form sports

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DOI 10.34660/INF.2024.48.90.001

根据《国际财务报告准则》制定生物资产会计组织
**DEVELOPMENT OF THE ORGANIZATION OF ACCOUNTING
FOR BIOLOGICAL ASSETS IN ACCORDANCE WITH IFRS**

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抽象的。组织和机构向国际标准过渡的方法建议以及根据国际财务报告准则编制报告的原则是制定会计政策的基础，会计政策必须反映国际标准的要求。本文讨论了农业经济部门生物资产会计、评估和报告发展的理论方面。指出了组织将资源分类为生物资产的标准、会计、评估和报告发展的优先领域。在向国际财务报告准则过渡的背景下，俄罗斯农业经济领域企业会计的立法规定尚不完善，需要完善和澄清。

关键词：公允价值、IFRS 41、生物资产、生物转化、估值、繁殖、退化。

Abstract. *Methodological recommendations for the transition to international standards of organizations and institutions, as well as principles for preparing reports in accordance with IFRS, are the basis for the development of Accounting Policies, which must reflect the requirements of international standards. The article discusses the theoretical aspects of the development of accounting, assessment and reporting of biological assets in the agricultural sector of the economy. The criteria by which organizations classify resources as biological assets, priority areas for the development of accounting, evaluation and reporting are indicated. In the context of the transition to IFRS, the legislative regulation of accounting in Russia for enterprises in the agricultural sector of the economy is imperfect and requires improvement and clarification.*

Keywords: *fair value, IFRS 41, biological asset, biotransformation, valuation, reproduction, degeneration.*

Agricultural business is one of the most pressing and necessary areas of entrepreneurship for any state. As in any business, in the agricultural business there are assets used in the work that need to be properly accounted for and shown in reporting.

In modern conditions, the development of the accounting system, aimed at bringing together the requirements of national and international standards, con-

tributes to greater independence of the organization in matters of choosing options and methods of accounting. Interest in the village has grown significantly in recent years. Russians are returning to agricultural work not only in their dacha plots, but are also thinking about deeper “naturalization.”

There are a number of problems in applying the main provisions of IAS 41 “Agriculture” in Russian practice. They are mainly due to differences in international and domestic conceptual provisions in accounting for agricultural activities.

This term was not used in domestic accounting policies, but it is actively used in international financial standards. Their harmonization is extremely important in the light of modern globalization processes. In the current system of regulatory accounting in Russia, there are no specific instructions on what “biological assets” are and how to keep records of them. However, in Western practice, these accounting objects have been known for a long time, and in Russia for several years there has been talk about the adoption of RAR, FED STD, dedicated to biological assets. Meanwhile, many organizations already have to resolve issues related to the reflection of the biological assets they use in accounting and reporting [8].

Methodological recommendations for the transition to international standards for agricultural organizations, as well as principles for preparing reports in accordance with IFRS, are the basis for the development of Accounting Policies, which should reflect the requirements of international standards.

At the initiative level, the formation of the organization’s Accounting Policy and chart of accounts should be organized in such a way that they reflect all aspects of accounting for biological assets related to the criteria for their recognition, reporting, depreciation, etc. [13].

Financial accounting of biological assets is carried out exclusively according to the international standard IFRS, namely IAS 41.

International Standard IAS 41 Agriculture defines Biological assets very simply: living plants and animals. However, not every plant and animal can be recognized as a business asset; clarification is obviously necessary.

According to the source, biological assets include living organisms (animals, plants, fungi) cultivated to obtain biological products (including wood), the natural growth and restoration of which are under the direct control, responsibility and management of the accounting entity.

The unit of accounting for biological assets is a nomenclature (registry) unit or a homogeneous (registry) group of biological assets.

Biotransformation is a process of growth, degeneration, production and reproduction that causes qualitative or quantitative changes in a biological asset.

Russian accounting standards do not contain the concept of “biological assets”. The very concept of biological assets, however, is quite often found in the works of Russian scientists dealing with issues of accounting in agricultural or-

ganizations, as well as the convergence of international and domestic accounting practices [7].

IFRS 41 suggests the following classification of biological assets.

Table 1
Classification of biological assets based on IFRS 41

Classification groups of bioactives	Classification subgroups	Examples
1 Consumable biological assets	1.1 Mature	
	1.2 Immature	Cropping of agricultural crops during the growth period; young beef cattle that have not reached productive age
2 Fruit-bearing biological assets	2.1 Mature	Dairy cows, perennial plantings that have reached fruiting age
	2.2 Immature	Heifers that have not reached productive age, perennial plantings that have not reached fruiting age

As for the different opinions of scientists about the economic essence of the concept of “biological assets”, as well as the classification of biological assets, they are all based on IFRS 41, without significantly differing in essence.

Assessment of a bioactive - recording changes in its various indicators:

- by quantity (number of animals, area, offspring, weight, length, etc.);
- by quality (fiber strength, fat content, etc.).

Performed at the time of initial recognition and subsequently for reporting periods.

Upon first recognition and capitalization and subsequent accounting, a biological asset is measured at its fair value as of the valuation date, from which estimated sales costs are deducted (clause 12 of IFRS 41). A fair valuation is the amount of money that knowledgeable, independent parties would be willing to pay for a given asset. Distribution costs include various duties, exchange fees, taxes associated with the transfer of property, commissions if the services of dealers and brokers were used.

For fair assessment, bioactives are divided into groups according to various indicators, for example, the number of livestock of the same age, breed, etc. is assessed. There is an objective difficulty associated with the relevance of assessment only at the time of assessment. Due to biotransformation and other factors, the value of an asset may change significantly. Here are the ways in which this point is resolved in modern practice:

1. Active market position. If the valued biological fund is traded on the market where it is expected to be sold, then the fair value will be the quoted price for this asset.

2. Last deal. If there is no active market, the price of the last transaction in any market is considered fair, unless significant market shocks have occurred between then and the end of the reporting period.

3. Adjustment of prices for analogues. Prices for similar assets are considered and adjusted depending on the degree of difference from the one being valued.

4. Industry indicators. Average price for the relevant sector.

5. Discounted value. The fair value of a bioasset is the expected amount of cash flows taking into account the discount factor. Factors of biotransformation of the asset are not taken into account.

6. Cost. In some cases, it is almost identical to a fair assessment, for example, if after investment of funds biotransformation does not have time to occur (for example, the field is sown just before the registration date), or it will not yet have an impact on the price (for example, one-year-old seedlings that are designed to bear fruit in age 5 years).

The following information about bioassets must be disclosed in accounting and financial statements:

- the amount of profit or loss for a given reporting period;
- characteristics of groups of bioactives;
- for each group, give quantitative and other calculated indicators based on the characteristics of the activity;
- the value of assets on the balance sheet with certain restrictions or pledged;
- features of financial risks;
- reconciliation data.

Biological assets purchased from outside are initially assessed and accounted for in account RAR 7 “Fixed assets” or 9 “Inventories” (if young animals are purchased that will not be used in the current period). According to IFRS (IAS 41), there are no such valuation guidelines: according to international standards, biological assets are valued only in the management of their biotransformation; their acquisition is not the subject of consideration of this standard. This is the main difference between the domestic approach to accounting of biological assets and international provisions in this regard. The latter are declared as the only way to reflect fair value less selling expenses.

IAS 41 provides examples of biological assets, agricultural products and the final results of their processing after receipt (collection) [5].

Table 2

Indicators of characteristics of biological assets according to IAS 41

Biological assets	Agricultural products	The final results of processing the received (collected) products
Sheep	Wool	Yarn, carpet
Trees in a forest plantation	Cut down trees	Logs, lumber
Plants	Cotton	Thread, clothes
	Harvested reeds	Sugar
Dairy cattle	Milk	Cheese
Pigs	Carcasses	Sausages, canned ham
Shrubs	Sheet	Tea, dried tobacco
Vineyards	Grape	Wine
Large-and-small fruits	Picked fruits	Processed fruits

The following should not be classified as bioactives:

- land areas;
- draft animals;
- animals whose maintenance is not related to the production of agricultural products (animal circuses, nature reserves, etc.);
- annual and perennial plantings from which the organization does not plan to obtain agricultural products (ornamental flowers, shrubs, protective forest belts, etc.).

If an active market exists for a biological asset or agricultural product in its current condition and location, the appropriate basis for determining the fair value of that asset is the price quoted in that market. However, if an enterprise has access to several active markets, the price of the most appropriate one in the context of the enterprise must be used. For example, if a company has access to two active markets, it is logical to use the price of the one on which it intends to enter into transactions.

If there is no active market, an entity uses one or more of the following measures to determine fair value:

- the price of the last transaction on the market - provided that in the period between the date of the transaction and the end of the reporting period there were no significant changes in business conditions;
- market prices for similar assets, adjusted to take into account differences;
- relevant industry indicators (for example, the cost of horticultural plantings per export tray, bushel or hectare and the cost of cattle per kilogram of meat).

Fair value should also reflect the possibility of fluctuations in cash flows, which are taken into account when the transaction price is negotiated by independent, knowledgeable, willing buyers and sellers.

Accounting and reporting must reflect profits and losses that may arise:

- upon initial recognition of a biological asset at fair value less costs to sell;
- subsequently as a result of changes in the fair value of the biological asset less costs to sell;
- upon initial recognition of agricultural products (as a result of receipt or collection of these products).

In particular, a loss on initial recognition of a biological asset may arise precisely because costs to sell are deducted from its fair value. And profits can arise when a biological asset is initially recognized—as, for example, when a calf is born.

The rules, norms, and standards that allow for proper accounting of such assets are not clearly stated in the PBU.

Within the framework of the Russian regulatory framework, when recognizing income and expenses (profits and losses), one should be guided by the requirements of PBU 9/99 “Income of the Organization” and PBU 10/99 “Expenses of the Organization”.

The Federal Accounting Standard for Public Finance “Biological Assets” was approved by Order of the Ministry of Finance of Russia dated December 16, 2020 No. 310n.

The standard establishes uniform requirements for accounting of assets classified as biological assets, as well as requirements for information about biological assets (the results of transactions with them) disclosed in accounting (financial) statements.

For accounting of transactions with biological assets according to the rules of the federal standard, account 113 00 “Biological assets” is intended.

The account analytics are as follows:

113 20 “Biological assets are particularly valuable movable property of an institution”

113 30 “Biological assets - other movable property of the institution”

Objects of biological assets are accounted for in an account containing the corresponding analytical code of the type of synthetic account:

- 1 - “Animals in cultivation”;
- 2 - “Animals for fattening”;
- 3 - “Perennial plantings grown in nurseries as planting material that have not reached their biological maturity”;
- 4 - “Perennial plantings intended for obtaining biological products that have not reached their biological maturity”;
- 5 - “Other biological assets for growing and fattening”;
- 6 - “Productive and breeding livestock, fish, poultry, rabbits, fur-bearing animals, bee families”;

7 - “Annual plantings intended for the production of biological products, including seedlings”;

8 - “Perennial plantings that have reached their biological maturity and are suitable for collecting/obtaining biological products”;

9 - “Other biological assets that have reached biological maturity” [2].

The reform of accounting in Russia is aimed at its harmonious development in accordance with International Financial Reporting Standards. For the effective development of the agricultural sector of the Russian economy, it is necessary to have a system for presenting accounting information adequate to market relations, which allows using all the available resources of an agricultural organization with maximum efficiency. In modern conditions, the development of the accounting system, aimed at bringing together the requirements of national and international standards, contributes to greater independence of the organization in the selection of options and methods of accounting [8].

Regulatory regulation of accounting and reporting of domestic agricultural organizations should be aimed at convergence with the norms of international financial reporting standards (IFRS), the priority goal of which is to satisfy the needs of internal and external interested users of financial statements in relevant information necessary for making management decisions.

Biological assets acquired from outside are initially assessed and included in (IAS) 16 IFRS “Property, Plant and Equipment”, or (IAS) 2 IFRS “Inventories” (if young animals are purchased that will not be used in the current period). According to IAS 41, there are no such valuation guidelines: according to international standards, biological assets are valued only in the management of their biotransformation; their acquisition is not the subject of this standard. This is the main difference between the domestic approach to accounting of biological assets and international provisions in this regard. The latter are declared as the only way to reflect fair value less selling expenses.

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DOI 10.34660/INF.2024.34.21.002

团结是俄罗斯刑事诉讼的新原则
**SOLIDARITY IS A NEW PRINCIPLE IN RUSSIAN CRIMINAL
PROCEEDINGS**

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注解。 本文致力于在团结的基础上规范刑事法律关系。 分析了俄罗斯因违反公私利益合理平衡而导致刑事诉讼无效的问题。

关键词：团结、原则、刑事诉讼、效率、合理平衡。

Annotation. *The article is devoted to the need to regulate criminal legal relations on the basis of solidarity. The problem of ineffectiveness of criminal proceedings in Russia due to the violation of a reasonable balance of public and private interests is analyzed.*

Keywords: *solidarity, principle, criminal proceedings, efficiency, reasonable balance.*

The criminal process in Russia is developing along the path of optimization, searching for the most effective ways to ensure the rights of victims and quickly making amends for the harm caused, procedural economy, a focus on correcting the person who committed the crime, and saving measures of criminal repression.

In this regard, in the science of criminal proceedings, a point of view is expressed about “the state’s appeal to contractual, alternative forms of resolving criminal legal disputes” as a new ideology of the criminal policy of the Russian state¹.

The opinion of proceduralists is divided.

Thus, a number of scientists state the existence of two models of alternative methods of resolving criminal legal conflicts. They associate one of them with the termination of criminal proceedings in connection with the release of a person from criminal liability, and the other is presented in the form of acceleration (simplification) of the criminal procedural procedure on the basis of mutual consent of the parties to the conflict, including a significant mitigation of criminal liability. Other scientists believe that in cases where the outcome of the procedure is the

resolution of the question of a person's guilt in the verdict, there can be no talk of an alternative to traditional criminal justice².

Monitoring of appeals received by the Commissioner for Human Rights in the Russian Federation (in text – RF), allows us to come to the conclusion that illegal termination of criminal cases entails a significant violation of the rights of crime victims to access justice, as well as a loss of confidence in the law enforcement system.

For example, in 2022, the prosecutor canceled 20,907 illegal decisions to terminate criminal cases, and in 2021 - 23,298³.

At the initiative of the Supreme Court of the Russian Federation, the grounds for exemption from criminal liability related to non-rehabilitative grounds for termination of a criminal case (prosecution) are being expanded.

Some scientists call them not bases, but species⁴.

The current criminal procedural procedure for terminating a criminal case (prosecution) in connection with the release of a person from criminal liability, being the most pragmatic and expedient alternative form of resolving criminal legal disputes, requires systemic reform.

It seems necessary, first of all, to abandon the tradition of terminating criminal cases on non-rehabilitative grounds, when, due to a weak evidence base, the preliminary investigation body or prosecutor lacks confidence in the so-called judicial perspective of the criminal case⁵.

In addition, according to the Commissioner for Human Rights in the Russian Federation in 2022, about 40% of the total number of criminal cases initiated are criminal cases, the proceedings of which were suspended at the stage of preliminary investigation due to failure to identify the person to be charged as an accused (para. 1 part 1 article 208 of the Criminal Procedure Code (in the text - the Code of Criminal Procedure) of the Russian Federation), of which the absolute majority are subsequently terminated due to the expiration of the statute of limitations for criminal prosecution⁶.

It is obvious that such a practice leads to a violation of the rights of the victim interested in solving the crime, establishing the truth in the case, exposing the criminal and fair retribution for the crime, as well as a violation of the rights of the civil plaintiff in terms of compensation for damage caused.

In this regard, it is necessary to create an effective mechanism for compensation for damage caused by a crime, which is currently missing, although Article 52 of the Constitution of the Russian Federation guarantees that the state provides victims with compensation for damage caused.

In order to more effectively restore social justice, a Fund for Assistance to Victims should be organized, the activities of which could be regulated by a separate law regulating the conditions, types and amounts of compensation for damage

caused by a crime. At the same time, payment of compensation will not cancel the obligation to compensate harm to the suspects (accused, defendants).

The victim assistance fund could be formed from funds confiscated in a criminal case, from bail amounts turned into state revenue, as well as from funds paid as a court fine upon release from criminal liability. At the same time, the Fund must necessarily act under the control of the state in order to avoid possible abuses.

Attempts made by the legislator to increase the efficiency of criminal proceedings do not provide a long-term effect, do not ensure a fair resolution of criminal legal conflicts that is fully consistent with the interests of the individual, society and the state, which, in our opinion, is associated with a violation of the reasonable balance of public and private interests.

Thus, on the one hand, the state actively shows a humane attitude towards criminals, decriminalizing certain acts, introducing crimes with administrative prejudice, expanding the grounds for applying the institution of exemption from criminal liability, and on the other hand, there is a high percentage of unsolved criminal cases that are subsequently terminated due to the expiration of deadlines. Due to the statute of limitations of criminal prosecution, damages to victims in most cases are not compensated.

The reasons for this lie in the priority of the idea of individual freedom laid down in the 2001 Code of Criminal Procedure of the Russian Federation.

The Constitution of the Russian Federation, as amended in 1993, marked a change in the political regime and a transition from the ideas of collectivism and social solidarity to the idea of individual freedom, which is dominant in leading Western states. At the same time, the peculiarities of the Russian mentality, the traditions of our state and law, the need of society to protect the weak were not enshrined in the Basic Law of the country.

According to Professor V.V. Doroshkov, the sharp breakdown of the political regime and the entire social formation led to a certain moral degradation in society, an increase in conflicts and crime, including violent and corruption, the replacement of the concepts of “freedom” with the category of “permissiveness”, “legality” with “expediency”⁷.

The unconditional priority of human rights and freedoms over the interests of society and the state leads to the fact that “often only the rights of individuals with power and money are actually protected”⁸.

Meanwhile, the results of sociological research and the conclusions of domestic scientists indicate an increased demand in Russian society for truth and justice, a rejection of the human-centric dogma of law borrowed from Western civilization⁹.

The legal development of society is impossible in isolation from its historical, moral and value basis¹⁰.

As a result, on July 1, 2020, during the all-Russian vote, amendments to the Constitution of the Russian Federation were approved, enshrining new principles of state policy, such as: justice, humanism, public solidarity, balancing private and public interests.

At the same time, high moral ideals; priority of the spiritual over the material; humanism; mercy; justice; collectivism; mutual assistance and mutual respect are classified in the new National Security Strategy of the Russian Federation as traditional Russian spiritual and moral values, which are subject to preservation and protection in all spheres of human activity¹¹.

These principles-values should be analyzed by scientists in various branches of law and find their embodiment in legislative and law enforcement activities. This is of particular relevance for criminal proceedings, the purpose of which is still formulated in Article 6 of the Code of Criminal Procedure of the Russian Federation, taking into account the priority of individual freedom.

It is noteworthy that earlier in the Criminal Procedure Code of the RSFSR of 1960, Article 2 set the task of strengthening law and order, preventing and eradicating crimes, protecting the interests of society, the rights and freedoms of citizens, educating citizens in the spirit of strict observance of the Constitution, respect for the rules of society¹².

Thus, criminal proceedings should set itself the task of protecting society as a whole, but at the same time, the public should not prevail to the detriment of the private.

In the opinion of V.V. Doroshkov, the main reason for the unsatisfactory assessment of the new Code of Criminal Procedure of the Russian Federation of 2001 can be considered its real isolation from the spiritual and moral foundations inherent in the Russian people¹³.

It seems correct that the regulation of criminal law relations should be built on the principles of solidarity. This will ensure:

- 1) a balance of traditional values for Russian society and constitutionally recognized interests (private and public, certain private, individual and collective);
- 2) proportionality of the rights of the strong party relative to the weak party, not excluding “the imposition of additional obligations, if these do not constitute a disproportionate burden”¹⁴;
- 3) citizens’ trust in the law and actions of public authorities;
- 4) reconciliation of contradictions between the rights of various subjects of legal relations;
- 5) consolidation of society regardless of political, cultural, religious, ideological diversity.

The decisions of the Constitutional Court of the Russian Federation, revealing the humanistic nature of solidarity, exclude “both the unlimited public interfer-

ence in private life and the suppression of individual autonomy and the distortion of the essence of fundamental rights and freedoms by militant individualism”¹⁵.

The interpretation of solidarity after the constitutional reform of 2020 must be based on classical ideas about it as a principle combining moral and legal characteristics. In the process of interpretation, the content of solidarity should include such requirements for participants in legal relations as “mutual respect, partiality, flexibility and concessions. ... The indifference of participants in legal relations to each other creates conditions for abuse of rights and improper fulfillment of obligations, which negatively affects the entire legal system.”¹⁶.

The Constitutional Court of the Russian Federation especially emphasizes that the principle of solidarity helps to neutralize abuses of constitutional rights and freedoms in cases where “formal adherence to constitutional requirements leads to socially unacceptable results”¹⁷.

Thus, the above allows us to conclude that, along with the traditional principles of the criminal process¹⁸ solidarity should become a new basic idea of criminal procedural law, determining the social content and criminal-political orientation of the activities to disclose, investigate and resolve criminal cases. Solidarity should also determine the essence and purpose of criminal proceedings.

It is a reasonable balance of personal rights and legitimate interests of an individual, society and the state as a whole, achieved as a result of a constructive dialogue between the parties through the mediation of public institutions on the basis of solidarity, subject to the uniform application of the rule of law, that will resolve pressing issues of criminal proceedings and will contribute to increasing its effectiveness and, as a result, achieving the goal of effectively fighting crime.

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协助自杀和安乐死合法化的问题：生命权与死亡权

**PROBLEMS OF LEGALIZATION OF ASSISTED SUICIDE AND
EUTHANASIA: THE RIGHT TO LIFE VERSUS THE RIGHT TO DIE**

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抽象的。协助自杀和安乐死是公众和立法者越来越多讨论的现象。已经将这些程序合法化的国家和已经走合法化道路的国家面临着类似的问题。本文探讨了俄罗斯联邦立法者在考虑俄罗斯协助自杀和/或安乐死合法化问题时将面临的问题。

关键词：协助自杀、安乐死、谋杀、法律规制、生命权、死亡权。

Abstract. *Assisted suicide and euthanasia are phenomena that are increasingly discussed by the public and legislators. Countries that have already legalized these procedures and countries that have taken the path of legalization face similar problems. The article examines the problems that the legislator of the Russian Federation will face when considering the issue of legalizing assisted suicide and/or euthanasia in Russia.*

Keywords: *assisted suicide, euthanasia, murder, legal regulation, right to life, right to death.*

Assisted suicide and euthanasia, as well as their legalization, became one of the most discussed problems at the turn of the 20th-21st centuries in bioethics, medicine and law, dividing society into supporters and opponents of euthanasia and assisted suicide. Discussions about the legalization of these practices have resulted in a unification of the positions of the main religions on this issue, which happens extremely rarely. Lawmakers are addressing the issue of promoting assisted suicide and euthanasia in three different ways. Some countries refuse to legalize euthanasia, recognizing it as simple murder or, in some cases, qualified murder (Chile, Turkey, Czech Republic, Finland, etc.). Others, recognizing euthanasia as murder, single it out as a privileged crime (Austria, Poland, Denmark, Germany). The third, smallest group of countries legalizes the procedure by es-

establishing certain criteria under which euthanasia (and/or assisted suicide) is recognized as a legal medical procedure. I would like to dwell on the problems of legalizing assisted suicide and euthanasia, which legislators in countries that have already managed to legalize these procedures have encountered.

Euthanasia and assisted suicide have been legalized in 10 countries as of early 2024 (Belgium, Canada, Colombia, Ecuador, Luxembourg, the Netherlands, New Zealand, Portugal (the law has not yet come into force), Spain and all six states of Australia). At the same time, legislators in foreign countries face similar problems in the process of legalizing these practices. Laws and guidelines are made to prevent abuse and misuse of procedures.

The first problem that confronts legislators is determining the presence or absence of the right to death, which corresponds to the right to life. If the right to death is recognized as existing, the legislator is forced to recognize various forms of its implementation, including procedures such as assisted suicide and euthanasia. Most countries do not recognize the existence of the right to die, thereby protecting themselves from the need to legalize assisted suicide and euthanasia.

Countries that recognize only the right to life consider assisted suicide and euthanasia as forms of unnatural termination of life, which, of course, is incompatible with the concept of “right to life,” because this right is manifested through the duty of the state to protect life and the duty of the doctor to provide assistance and not harm patients. Proponents of recognizing only the right to life have coined the term “slippery slope”, reflecting a complex legal and philosophical concept, the essence of which is that with one exception to the law, more exceptions will follow until a point is reached that is initially considered unacceptable by the legislator (An example most often cited is the removal of the age criterion or the criterion of the presence of an incurable disease for the procedure of assisted suicide and/or euthanasia).

The interpretation of the term “slippery slope” proposed by John Keown seems very relevant¹. He notes that the legalization of one type of euthanasia will inevitably entail the legalization of less acceptable forms of euthanasia, up to the legalization of euthanasia “on request” for everyone without taking into account certain criteria (This is exactly the problem that legislators in European countries are currently facing). It is also noted that euthanasia, currently considered as a last resort, can completely replace alternative methods, such as, for example, palliative care due to the lower cost and speed of the procedure.

The circumvention of safeguards and laws, with little or no criminal prosecution, is evidence of the “slippery slope” phenomenon described by John Keown. This point of view is partly supported by a study carried out by Tinne Smets,

¹ Keown J. Euthanasia, ethics and public policy: an argument against legalisation. – Cambridge University Press, 2018.

Johan Bilsen, Joachim Koen, and Luc Deliens, which showed that until now not a single case related to euthanasia has been brought to court, in the Netherlands only 16 cases, which does not exceed 0.2 of all euthanasia procedures performed, while none of the defendants were brought to criminal liability². This may indicate, on the one hand, the presence of truly working laws and criteria for carrying out euthanasia and assisted suicide procedures (including the creation of medical commissions, mandatory second opinions, strict reporting, etc.), and growing tolerance to violation of the law when carrying out euthanasia and assisted suicide procedures.

The next problem is the lack of a legal framework for the immediate legalization of assisted suicide and euthanasia. Simultaneous legalization in the absence of a regulatory framework and determination of criteria for carrying out procedures (as well as the preparation of special institutions or departments in existing institutions) will lead to massive abuses in this area. For example, the issue of abuse of euthanasia by family members or other persons to inherit the patient's property is being actively discussed. Because of the potential for abuse, there is a need to protect patients, as well as doctors treating terminally ill patients, from unnecessary litigation. Another problem arising from the lack of a regulatory framework is the problem of the possible commercialization of healthcare, since in the absence of legislative criteria, the healthcare sector will become a means of getting rid of "undesirable" members of society for a certain amount of money. The question also arises of choosing between long and grueling treatment for diseases, including depression or mental disorders, and the easier (in terms of speed of obtaining results) euthanasia procedure. An example is 17-year-old Nou Pothoven, who suffers from depression, PTSD and a personality disorder, and decided to undergo euthanasia 2 days after the minimum age threshold for the procedure³.

These problems make it impossible to immediately legalize euthanasia due to the possible increase in crime, which forces legislators to follow the path of gradual legalization of assisted suicide and/or euthanasia through the identification of euthanasia as a privileged element of murder.

Another problem on the path to the legalization of assisted suicide and euthanasia is the active opposition to the legalization process on the part of religious communities. This problem manifested itself most clearly during the legalization of euthanasia in Portugal and Spain. The Catholic Church, united with other faiths, actively prevented the legalization of euthanasia, which extended the process of

² Smets T, Bilsen J, Cohen J, Rurup ML, De Keyser E, Deliens L. The medical practice of euthanasia in Belgium and the Netherlands: legal notification, control and evaluation procedures. *Health Policy*. 2009 May;90(2-3):181-7. doi: 10.1016/j.healthpol.2008.10.003.

³ In Holland, a 17-year-old girl who survived rape resorted to euthanasia. // [Electronic resource] // RIA Novosti. URL: <https://ria.ru/20190605/1555276931.html>

adopting a law on the legalization of euthanasia for several years⁴. It seems that a similar scenario awaits the Russian Federation in the event of an attempt to simultaneously legalize euthanasia, given that representatives of the Abrahamic monotheistic religions have already signed a joint document on the position of religions on issues relating to the end of human life⁵. Representatives of the three Abrahamic monotheistic religions have formed a unified view, expressed in open opposition to the euthanasia procedure, recognizing it as a crime not only against the individual, but also against God, as well as calling on people professing these religions to abandon this procedure in favor of palliative care.

To summarize, it should be noted that in one way or another every legislator faces the above-mentioned problems when considering the issue of legalizing assisted suicide and euthanasia. If assisted suicide and euthanasia are legalized in the Russian Federation, our legislator will face similar problems. There seems to be only one possible way to legalize assisted suicide and euthanasia in the Russian Federation - through the gradual decriminalization of the act; the path of instant legalization seems dangerous and unpreferable not only for a specific person or society, but also for the state as a whole.

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⁵ Position Paper of the Abrahamic Monotheistic Religions on Matters Concerning the End of Life. October 28, 2019. // [Electronic resource]. URL: https://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_20200714_samarit...https://www.academyforlife.va/content/dam/pav/documenti%20pdf/2019/Religioni_Cure%20Palliative_28%20ottobre/Testi%20Dichiarazione/PositionPaper_ENG_OK.pdf

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DOI 10.34660/INF.2024.21.53.004

自主海运的法律监管和前景
**LEGAL REGULATION AND PROSPECTS FOR AUTONOMOUS
MARITIME SHIPPING**

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注解。 本文讨论了将自主船舶引入海上运输的问题，分析了无人船舶运营的前景和风险，审视了现阶段旨在规范无人航行的国际和国家立法的现有法律规范，评估了其完整性 以及现行自主航运监管框架的适用性，并阐述了该领域存在的问题。

关键词：人工智能、自主航运、国际和国家立法。

Annotation. *The article discusses the issue of introducing autonomous ships into maritime shipping, analyzes the prospects and risks associated with the operation of unmanned ships, examines the existing legal norms of international and national legislation at this stage of development designed to regulate unmanned navigation, assesses the completeness and applicability of the current regulatory framework regarding autonomous shipping , and also formulates the problems existing in this area.*

Keywords: *artificial intelligence, autonomous shipping, international and national legislation.*

The use of modern technologies, namely artificial intelligence, is a promising direction for the development of many industries, including the maritime industry. The most attractive area of modernization of shipping can be called the creation of autonomous ships that have sufficient capabilities to independently analyze the navigation situation, make the necessary decisions and, in principle, function without crew intervention. The introduction of unmanned ships has the potential to significantly improve the efficiency and safety of maritime transport. At the same time, in connection with the introduction into operation of sea vessels equipped with an artificial intelligence system, there is a need for a comprehensive expansion and addition of legal norms. The currently existing norms of international maritime law do not fully take into account all the specifics of autonomous ships. This situation creates a legal deficiency, and at the same times the danger of incidents.

The relevance of this topic is due to the active improvement of autonomous navigation technologies, which has been especially noticeable in recent years. Scandinavian countries such as Norway and Denmark, as well as a number of other states such as China, Japan, South Korea, Finland and Russia are already intensively testing prototypes of unmanned sea vessels. Some experts see the beginning of the mass use of such vessels in the next decade. That is why it is fundamentally important to first develop the necessary legal norms in order to build a clear system of standards that will minimize all potential risks that may arise in this area.

These days, artificial intelligence technologies are already widely used in the maritime industry to perform various tasks. However, the concept of fully autonomous sea vessels that can operate effectively without a crew on board is of greatest interest. The development of such vessels is actively underway in many countries. The first autonomous maritime vessel was unveiled in December 2018 by Rolls-Royce and Finferries, with the ferry Falco demonstrating its capabilities during a voyage between Parainen and Nauvo in Finland [1]. Another example is Norway, where in 2017 the Kongsberg Company began work on the autonomous container ship Yara Birkeland [2]. It is worth noting that this ship is not only one of the first unmanned cargo ships, but also the first cargo ship to boast zero emissions, as the Yara Birkeland is electric. This vessel was designed for carrying out cargo transportation with the condition that there was no crew on board. This means that it only transmits the necessary information to the shore in real time, which is necessary for safety in case of emergencies. In addition, the vessel has the ability to perform automatic mooring in the port. After completing a number of different tests, the Norwegian vessel made a test voyage on the Oslofjord in November 2021 and was put officially into service in April 2022, transporting fertilizer from the Yara plant in Porsgrunn to the port of Brevik. The developers note that this vessel will be able to replace approximately 40,000 trucks per year. In addition, from June 2023 in Sweden, between the islands of Stockholm, the unmanned electric passenger ferry Estelle, developed by the Norwegian company Torghatten, began operating [3]. In Japan, the non-profit Nippon Foundation, together with a number of other companies such as Mitsui Lines, Japan Railway Construction and Mitsubishi, created a project to develop unmanned sea vessels, Designing the Future of Full Autonomous Ship (DFFAS). In January 2022, the companies conducted a test flight of an unmanned car ferry in the north of the island of Kyushu (Japan) as part of the MEGURI 2040 unmanned sea vessels development program [4]. During the test, the unmanned ferry traveled a distance of 240 kilometers and performed automatic mooring. Also in January 2022, a test voyage of the Japanese unmanned container ship Mikage was carried out [5]. In addition, several more test voyages of unmanned sea vessels were carried out in Japan throughout 2022. In April of the same year, China also put into operation the electric unmanned container ship

Zhi Fei, developed by Bestway with the support of several Chinese universities [6]. This vessel is already transporting goods between some ports in Shandong province. In the same year 2022, The South Korean unmanned tanker Prism Courage, built by HD Hyundai and designed to transport LNG, made its first voyage across the Pacific Ocean [7]. The ship left Freeport (Texas, USA) in May, passed through the Panama Canal and arrived in the port of Boryeong (South Korea) in June. Although there was a crew on this ship during the entire voyage, half of the way the ship was controlled by artificial intelligence. Russia, in turn, also launched the autonomous ferry “General Chernyakhovsky” in December 2023, serving the sea line between the Leningrad and Kaliningrad regions [8]. This vessel was the first in the country to begin operating in remote control mode. Similar projects are also being implemented in Denmark and Finland.

The positive aspects of the introduction of autonomous maritime vessels include a significant increase in the efficiency of transportation by sea, a reduction in freight costs and, to some extent, an improvement in environmental performance. Unmanned sea vessels are less susceptible to the “human factor”, which significantly increases the overall level of navigation safety. Also, such ships eliminate the cost of systems to support the life of the crew on board (under current circumstances, about 30% of costs are for maintaining the crew). With all these advantages, autonomous shipping has certain risks, especially when it comes to the initial phase of commissioning sea vessels without a crew.

AI systems are already quite actively used to implement various functions, for example, regarding optimizing navigation and increasing its level of safety. Modern AI systems are capable of real-time analysis of data received from a number of sensors on a sea vessel, which reduces the risk of the vessel running aground, a possible collision, and so on. It is clear that AI will be introduced in stages, so it is important to note that fully autonomous shipping should be considered as the final stage of the entire process of automation in the maritime industry.

Nevertheless, to implement the projects under development, it is not enough just to create all the necessary technical means; in addition, there is an urgent question about the legal regulation of all innovations. Therefore, it is advisable to review and modify existing international and national legal norms.

By its nature, maritime shipping is a global activity and covers the entire globe. Therefore, the key role regarding legal regulation lies with the International Maritime Organization (IMO), which develops standards applicable throughout the world. Throughout the history of legal regulation of maritime shipping, many international legislative acts have been developed. Today the following are actively used: International Convention for the Safety of Life at Sea 1974 (SOLAS-74), International Convention for the Protection of the Marine Environment against Pollution from Ships (MARPOL-73/78), International Regulations for Preventing

Collisions at Sea (IPPS72) , International Convention on Maritime Search and Rescue (SAR-79), International Convention on Load Lines (KGM-66) and others. But the problem is that all these acts imply the presence of a crew on board a sea vessel, becoming irrelevant when it comes to autonomous shipping. These conventions consider the presence of crew on board the ship as a starting point. The need for a crew on board is most noticeably manifested in the provisions of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW-78). The use of autonomous maritime vessels will primarily require new competencies and training standards for seafarers. "...as part of the implementation of the state program for supporting universities Priority 2030. Russian University of Transport together with State Maritime University named after Admiral F.F. Ushakov develops and implements new training programs to train new personnel for the industry" [9].

The above documents establish certain rules for the conduct of crewmembers on the ship, as well as rules for the interaction of the ship with various coastal structures and other ships. In addition, precisely the crew on board carries out such interactions. For example, it is unclear how the participation of an autonomous vessel will be carried out in rescue operations regarding the search for and lifting on board persons who have suffered a sea disaster if there are no people on the vessel itself. In addition, the question of who will be responsible in the event of any accidents or incidents of an unmanned vessel in the case where all control is exercised by AI without human intervention has not been resolved. Unlike a traditional vessel, where responsibility rests with the captain, responsibility for an autonomous vessel can be centered on the ship-owner. There is also a conflict regarding situations where unmanned sea vessels collide with each other, because the investigation of such cases becomes much more complicated due to the absence of a crew on board. Another big problem of autonomous shipping can be called maritime piracy, because with remote control of a vessel, the obstacles for attackers to seize cargo disappear, which puts shippers and consignees in a vulnerable position. Among other things, the use of AI technologies does not exclude the risk of various errors and failures in their operation, which can lead to death or environmental disaster. Thus, there is a growing need for the creation and adoption of legal norms aimed at regulating unmanned vessels, since the current legislation is not adapted to this [10].

As mentioned earlier, the International Maritime Organization (IMO) plays the main role in developing updated norms of international maritime law; it was the organization that took on this task at the beginning of 2018. The IMO has introduced the concept of Maritime Autonomous Surface Ships (MASS), which refers to ships that can operate to some extent independently of human interaction. At the same time, the IMO has defined 4 degrees of autonomy. At the first degree,

ship tasks are performed partially automatically, but at the same time, the crew on board the ship controls all operations, some of which are performed manually. In the second degree, all operations on the ship are carried out automatically, and the crew on board only controls all processes, intervening in them only when necessary. The next, third degree of autonomy assumes that shore personnel control the vessel remotely, and there is no crew on board the vessel itself. The last, fourth degree of autonomy (the highest) implies a fully autonomous vessel that is controlled independently without a ship or shore crew [11]. It should be added that certain legal regulation is necessary for each degree of autonomy, that is, each stage requires its own specific norms, since in each described case the completeness of tasks and responsibilities varies greatly.

In total, there are 5 committees within the IMO, one of which is the Maritime Safety Committee (MSC). During the preliminary study, this committee carried out a detailed analysis of regulatory instruments - the main documents in the field of international maritime law were reviewed in the context of applicability regarding autonomous shipping. At the 101st session of the MSC in June 2019, temporary recommendations regarding the testing of the MASS were presented [12], which became a very important step in the issue of legal regulation of unmanned navigation at the initial stage, since during the test period ensuring the necessary level of safety, protection and protection of the environment, as well as the life and health of humans and other living organisms, is a mandatory component, and in this regard, it seems logical to transform these temporary recommendations into mandatory requirements in the future. The MASS tests themselves are also extremely important, since they are aimed at collecting specific information about the state of the safety level of autonomous ships at various stages of testing and in a variety of conditions and situations. These tests are aimed at helping to identify anticipated risks that MASS may face in the future, and at the same time make the necessary adjustments to eliminate certain shortcomings. Thus, MASS testing is inextricably linked with the process of development and formation of the field under consideration. In addition, one of the main activities of the MSC is the development of the MASS Code, which is planned to be put into effect in 2025 as a recommendation document, and from 2028, this code will be mandatory. The Code is intended to regulate the use of AI technologies in the field of navigation, as well as to promote their effective application in the field of international maritime transport. Work on the MASS code has been ongoing for several years and its intermediate results are presented at the annual sessions of the MSC.

In addition, many states are already working closely on national legislation on the operation of autonomous ships; Russia is no exception. First, by order of the Government of the Russian Federation dated March 29, 2018 No. 534-r, the “road map” was approved. The goal of the “road map” is to improve legislation

and eliminate administrative barriers to ensure the implementation of the National Technology Initiative in the Marinet direction [13]. One of the components of the “road map” is measures to amend the legislation of the Russian Federation on the operation of autonomous sea vessels. Later, Russian President Vladimir Putin signed the Federal Law of July 10, 2023 No. 294-FZ “On Amendments to Certain Legislative Acts of the Russian Federation” [14]. This law implies the introduction of additions regarding autonomous ships to the Merchant Shipping Code (KTM RF) and the Code of Inland Water Transport (KVVT RF), as well as to the laws on seaports and transport security. Unlike the IMO, which defines 4 degrees of autonomy, Russian legislation introduces only 2 degrees of autonomy, namely “fully autonomous vessel” and “semi-autonomous vessel”. It should also be noted that in this document the people who control the ship remotely, that is, those on shore, are also referred to as the crew simply with the addition of the word “external”. Based on this, the question arises of how and by what the labor of such workers will be regulated, because the Maritime Labor Convention (MLC-2006) in this case loses its relevance due to the fact that the working conditions of the “shore crew” are strikingly different from the working conditions crew directly on board the ship. Thus, the work of external crew members is regulated only by the Labor Code (LC RF); in this regard, it is necessary to include the concept of “external crew” in the Labor Code, as well as determine the legal status of such workers. In addition, according to the new Federal Law, for damage caused by an autonomous vessel, the owner of the vessel, the organization managing the vessel and the manufacturer of equipment and software are jointly and severally liable. Obviously, the autonomous vessel is equipped with multiple high-tech systems with AI, which means that there are also a very large number of developers for such equipment. However, a situation in which everyone will bear responsibility if something happens can significantly reduce the desire of certain companies to install their equipment or software on autonomous ships. In such conditions, it would seem more rational to either distribute responsibility depending on the contribution and role of a particular developer in the software, or pre-appoint a responsible person. In addition, the law contains provisions according to which the external master is obliged to provide assistance to any person in distress, and also after a collision with another vessel to provide assistance to him. At first glance, these instructions look quite standard and logical, but the question arises of how this will be implemented if we are talking about a completely autonomous vessel with only a so-called external crew and the absence of the usual crew on board the vessel itself. As an alternative, a provision could be included in the law, according to which the ship-owner is obligated to enter into an agreement with an organization that carries out rescue at sea, which, in the event of an incident, will be ready to take the necessary actions in a certain region. Besides all of the above, the law does not provide for provisions regarding insurance of au-

tonomous ships, which must be included in the future. Thus, these additions to the Merchant Shipping Code of the Russian Federation, although they contain a large number of specific definitions and regulations, are nevertheless not exhaustive and require further refinement and detail.

In conclusion, it is worth saying that autonomous shipping is undoubtedly a promising and, most importantly, a rapidly developing industry. In addition to the introduction of the most advanced technical means into sea vessels, it is also necessary to create the necessary port infrastructure focused on MASS, as well as ensure regulatory regulation at the proper level, which requires a comprehensive and detailed reworking of the existing legal field. As it became clear, the current legislation is not adapted to autonomous shipping. It is obvious that even after the adoption of new regulations, as legal gaps are identified, the necessary changes and additions will be made to them. It is also important to take into account that shipping is an area that is global in nature, and from this it follows that those international legal acts will be of great importance; this is seen as the need for a single convention regulating the operation of the MASS, which will be ratified by the majority of states. It is therefore likely that the IMO will continue to have a key role regarding this issue. It is important to note that one should not expect a sharp and full-scale transition to autonomous shipping; this is a gradual process that needs constant monitoring and adjustment, and, most likely, in the next decade, shipping will have a hybrid nature, because until legal regulation is at a sufficient level, the use of MASS is difficult. Automation of various processes in the field of navigation is no exception; in the modern world, the trend of digitalization is clearly visible in many industries and most often the technical side is ahead of the legal side, forcing the latter to quickly catch up, so it is extremely important to strive to ensure that both of these sides are close to balance. It is obvious that any activity and any relationship requires an appropriate regulatory framework, and in a rapidly changing world, it is extremely important to adapt to these changes in order to avoid legal chaos.

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DOI 10.34660/INF.2024.26.88.005

教育过程在自我实现准备中的作用
**THE ROLE OF EDUCATIONAL PROCESS IN THE FORMATION
OF READINESS FOR SELF-ACTUALISATION**

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抽象的。本文致力于在自我实现准备的形成方面对教育和教学交流的思考。为了自我实现，每个人都需要具备实现自我实现所需的某些知识和技能，即准备好开展旨在自我实现的活动。自我实现在教育过程中显得尤为重要，因为社会不仅需要了解自己专业的专家，而且现代社会需要能够在各种专业活动中实现自我、具有创造力、能够充分评估自己和能力的人格。他在不同社会条件下的能力。

关键词：自我实现、教育过程、设定点、内部储备、个性、准备形成、自我实现准备。

Abstract. *This article is devoted to the consideration of educational and pedagogical communication in the aspect of the formation of readiness for self-actualisation. In order to self-actualise, each person needs to possess certain knowledge and skills necessary for its implementation, i.e. to be ready to carry out activities aimed at self-actualisation. Self-realisation becomes especially demanded in the educational process, because the society needs not only specialists who know their specialty well, but also modern society needs a personality capable of realising himself in various types of professional activity, creativity, able to adequately assess himself and his capabilities in different social conditions.*

Keywords: *self-actualisation, educational process, set-points, internal reserves, personality, readiness formation, readiness for self-actualisation.*

Self-actualisation, is it that simple? At first glance, the word “self-actualisation” seems very simple and clear. But if we try to define it, it becomes clear that it is not so. In pedagogy, self-realisation is understood as: “the expression of oneself, one’s tasks, internal reserves, which nature has endowed”[1]. Self-realisation, according to psychologists, is an integral part of a person’s life, in fact, defining the personality itself. [2,3,4,5]

In other words, in order to self-actualise, each person needs to possess certain knowledge and skills necessary for its implementation, i.e. to be ready to carry out activities aimed at self-actualisation. Especially demanded self-realisation becomes in the educational process, because society needs not only specialists who know their specialty well, but also modern society needs a personality capable of realising itself in various types of professional activity, creativity, able to adequately assess themselves and their capabilities in different social conditions. [6,7,8].

Let us find out what the real state of affairs is.

The data of the survey conducted among senior students of the University say that 90% of students note the importance and necessity of self-realisation in life and in the educational process in particular. They also note that they have repeatedly made attempts of their own self-realisation, but often those attempts were haphazard, chaotic and with doubtful success. The students noted that they experienced significant difficulties in the process of determining their own gifts and abilities; found a lack of knowledge necessary for regulating their own process of self-realisation; and regretted the absence of an assistant to assist their self-realisation in the educational process.

Based on the obtained data, it is obvious the contradiction between the existing need for self-realisation not only of society, but also of students, and the lack of knowledge, skills and abilities necessary for its successful implementation. It is also obvious that the whole process of self-realisation needs the assistance and guidance of an experienced teacher.[2]

The solution of this problem will consist in giving the student the opportunity to realise all those tasks, internal reserves, which endowed him with nature, in the educational process.[3].

Based on the ideas of human activity aimed at self-realisation, we will consider that the implementation of self-realisation requires the following: emotional attitude to oneself, one's position in the world; intellectual enlightenment in human science, spheres of social production; personal experience of self-management; physical and spiritual health.[2].

According to the above, we formulate the concept of "readiness for self-actualisation", which we will adhere to in the future: readiness for self-actualisation is an internal quality of the student, which is acquired in life activity (in particular, in the educational process) characterised by the degree of formation of generalised characteristics, thanks to which students can carry out self-actualisation of significant ideas for themselves.

The development of students' readiness for self-realisation takes place in the educational process through educational and pedagogical communication. Educational and pedagogical communication is a communication in which students and

teachers are considered as equal subjects of the corresponding type of interaction. Thus, equal accessibility to the participants of humane education of communication and information means of self-realisation of their essential properties in socially acceptable manifestations means the establishment of equal opportunities for everyone. Such communicative-informational means serve as a kind of source of stimulation of participants of education (in our case - students) to self-realisation of their essential properties. With their help it is possible to direct the efforts of educational participants to search for special communicative-informational means of self-realisation of their essential properties.[2,3,4,5,6,6,7,8,9,10].

It follows from all of the above that teaching and pedagogical communication consists in introducing students to social experience and methods of its assimilation, as well as in introducing them to socially useful activities through information.

The functions of educational and pedagogical communication are aimed at the development of readiness for self-realisation, and since educational and pedagogical communication is a communication between teacher and students on a parity basis, in turn, the functions of educational and pedagogical communication will not be reduced to management functions on the part of the teacher, but rather on the contrary, will encourage students to correct the teacher's activity, depending on the various stages of educational and pedagogical communication, aimed at promoting students' self-realisation. Informative function, its purpose is to identify the dominant needs of students in self-actualisation, also to determine why it is important to self-actualise and what qualities are necessary to possess for this purpose. Teaching function, its purpose is to set learning objectives in preparing students for self-actualisation. The deliberative function is aimed at students' success in their intentions to self-actualise in the educational process. The discussing function is aimed at achieving success of students in their intentions to self-actualise in the educational process. The discussion may include goal setting, the course of self-actualisation, the results of self-actualisation, options of social recognition of the results of self-actualisation.[2,3,4].

All functions of educational-pedagogical communication, formulated by us, are oriented precisely to help the student to understand himself, to determine his tasks, abilities, possibilities and thus, to give him (the student) the opportunity to look inside himself, to determine exactly the kind of activity, performing which he could self-realise. Thus, educational and pedagogical communication acts as the main factor in the formation of readiness for self-realisation. Educational and pedagogical communication is carried out with a focus on the disclosure of abilities and self-realisation, as well as in accordance with social and moral norms. [11,12,13,14,15,16,17,18].

The main goal of students' readiness for self-actualisation through educational and pedagogical communication is the formation of certain knowledge, skills, and

abilities necessary for self-actualisation not only in the educational process, but also in future life (whether professional or any other activity).

The purpose of educational and pedagogical communication is to implement a specially organised communication oriented to students' self-realisation. The purpose of this communication is to identify the dominant needs, abilities and talents of students, to encourage students to perform various activities aimed at self-realisation.

The aim of our work is to implement the educational-pedagogical communication on a parity basis between students and teachers; and to reflect in the topics of educational-pedagogical communication cognitive and creative tasks that can be useful to the student in self-realisation.[2,9,10,11,12].

The expected result of the learning and pedagogical communication is an increase in the state of readiness for self-realisation.

The results of the work have shown that among students there is a significant increase in awareness of intellectual enlightenment in human science, the subject of self-realisation, physical and spiritual health; there appeared efficiency, which is manifested in the emotional attitude to the subject of self-realisation, which strengthens the motivation for active activity in order to overcome internal discomfort in the process of which develops and skillfulness.

The obtained data allow us to note that the most effective is the formation of readiness for self-actualisation in those groups in which educational and pedagogical communication is carried out on a parity basis; in the formation of readiness for self-actualisation there is a reliance on the projected state as a consequence of the revealed state, and each cognitive type of work is complemented by a creative one.

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信息化时代中国高校线上线下融合教学的发展路径探讨
**DEVELOPMENT OF ONLINE-OFFLINE BLENDED TEACHING
IN CHINESE UNIVERSITIES UNDER BACKGROUND OF
INFORMATIZATION**

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摘要. 随着信息技术的快速发展,传统的线下教学模式已经不能满足日益多样化的学生需求,中国高校教育正面临着前所未有的挑战和机遇。而线上教育的兴起为教育提供了全新的可能性。因此,探讨信息化时代中国高校线上线下融合教学的发展路径具有重要意义。本文针对制约线上线下融合教学可持续发展的难点,提出了注重教育公平加快高校教育技术和网络设施建设,进行教学方法与教学资源整合和及时进行学生参与度与学习效果监测等解决问题的实践路径,以期为未来高校发展线上线下融合式教学提供借鉴。

关键词: 信息技术; 中国高校; 线上线下融合; 教学模式。

Abstract. *With the rapid development of information technology, the traditional offline teaching model can no longer meet the increasingly diverse needs of students, and Chinese higher education is facing unprecedented challenges and opportunities. The rise of online education has provided new possibilities for education. Therefore, it is of great significance to explore the development path of online and offline integrated teaching in Chinese universities in the information age. Aiming at the difficulties that restrict the sustainable development of online and offline integrated teaching, this paper proposes practical solutions to the problems, such as focusing on educational equity, accelerating the construction of educational technology and network facilities in universities, integrating teaching methods and teaching resources, and timely monitoring student participation and learning effects, in order to provide reference for the future development of online and offline integrated teaching in universities.*

Keywords: *Information technology; Chinese universities; Online and offline Integration; Teaching model.*

1. Research Background

With the rapid development of information technology and the popularization of the Internet, the information age is profoundly changing people's lifestyles and

social structures, especially in the field of education. As one of the most populous countries in the world, the development and reform of higher education in China has attracted much attention. The traditional education model has been unable to meet the increasingly diverse learning needs and the requirements of social development. Therefore, with the help of information technology, exploring online and offline integrated teaching has become an inevitable choice for the reform and development of Chinese higher education. The country also attaches great importance to the modernization of education. Since 2019, the Ministry of Education has clearly proposed the requirement to set up "online and offline hybrid gold courses" in the construction of first-class courses, using online high-quality resources for localization transformation, and creating hybrid courses suitable for the needs of students in this school^[1].

2.Challenges of online and offline integrated teaching in colleges and universities

As an emerging teaching model, online and offline integrated teaching aims to improve teaching effect and learning experience by integrating online and offline teaching resources and means. However, although online and offline integrated teaching has many advantages and potentials, it also faces many challenges and difficulties in practice. The following is a discussion on the practical challenges of online and offline integrated teaching:

2.1.Insufficient technical facilities and resources

As a new teaching model, online and offline integrated teaching is a "revolution in student-centered learning and teaching methods, subverting the traditional classroom teaching model." [2]In online and offline integrated teaching, the construction of technical facilities and resources is one of the basic challenges. However, the infrastructure and network environment in many regions are not perfect, and students and teachers cannot smoothly access and use online education resources. High-quality educational resources and teaching tools are also relatively scarce, which limits the development and application of online and offline integrated teaching. Therefore, some colleges and universities still remain at the level of traditional education and teaching models. For most college teachers, concepts such as online teaching, deep learning, mobile learning and smart campus are still new things.

2.2. Effective connection between online and offline teaching tests teachers' information literacy

Online and offline integrated teaching emphasizes the effective connection between online and offline teaching content. Teachers need to design flexible and diverse teaching content according to different online and offline teaching environments and student needs, and reasonably arrange teaching progress and course management. Under such requirements, most teachers believe that online teaching

requires 1 to 2 times more preparation energy than offline teaching [3], which means that the requirements and tasks of online and offline integrated teaching are higher, which objectively increases the difficulty of its promotion. At the same time, the proficient use of online teaching platforms and the proficiency in educational information technology are necessary conditions for carrying out online and offline integrated teaching, but the lack of educational information literacy of some teachers makes it difficult for them to master this new classroom form. The implicit increase in teaching tasks and the explicit improvement in teacher literacy requirements make it difficult for online and offline integrated teaching models to be widely promoted and used.

2.3 Low student participation and insufficient autonomous learning ability

In online and offline integrated teaching, student participation and interactivity are important factors affecting teaching effectiveness. However, due to the lack of face-to-face communication and interaction, students often lack the motivation to actively participate in teaching activities, resulting in poor teaching results. In the traditional offline teaching model, teachers can stimulate students' learning interest and motivation through classroom interaction and real-time feedback. However, in online and offline integrated teaching, students often need stronger autonomous learning ability and motivation, can independently manage and organize learning time, and actively participate in online learning activities. However, due to the lack of corresponding training and guidance, many students lack the ability and motivation to learn independently, resulting in poor online learning results.

2.4 Imperfect teaching quality evaluation system

The teaching quality evaluation of online and offline integrated teaching is a complex and critical issue. The traditional teaching quality evaluation system is often difficult to adapt to the characteristics and needs of online and offline integrated teaching, and cannot objectively evaluate the teaching and learning effects of teachers and students. Therefore, establishing a scientific teaching quality evaluation system, including teaching effect evaluation, student satisfaction survey, etc., is one of the keys to promote the development of online and offline integrated teaching.

3. Countermeasures: Implementation path of online and offline integrated teaching

As an emerging teaching model, online and offline integrated teaching in colleges and universities faces many challenges and difficulties. In essence, online and offline integrated teaching is to deeply integrate the four dimensions of learners, technical support, external environment and methods, with the ultimate goal of promoting individual development of learners and meeting their multiple needs of cognition, skills and emotions [4]. Therefore, in order to effectively challenge, colleges and universities need to formulate comprehensive response strategies and

make comprehensive considerations and measures from the aspects of technology, teaching, management, etc. The following are some strategies to cope with the challenges of online and offline integrated teaching in colleges and universities:

3.1 Focus on educational equity and accelerate the construction of educational technology and network facilities in colleges and universities

3.1.1 Implement educational equity policies and increase support for colleges and universities in remote and rural areas to ensure that they can enjoy the same online educational resources and technical support as developed areas. Carry out educational resource sharing and cooperation projects, establish an online educational resource sharing platform among colleges and universities, make full use of existing resources, and improve the efficiency and fairness of educational resource utilization.

3.1.2 Increase investment in technical facilities and network construction: Colleges and universities should increase investment in network infrastructure, improve the coverage and bandwidth of campus networks, and ensure that teachers and students can smoothly carry out online teaching activities.

3.1.3 Build a high-quality online education platform: Colleges and universities can establish independent online education platforms, provide rich teaching resources and tools, and provide teachers and students with a high-quality online learning environment.

3.1.4 Improve the technical support team: Set up a special technical support team to promptly solve technical problems that arise during online teaching, and provide technical support and training services for online teaching platforms for teachers and students.

3.2 Integrate teaching methods and teaching resources

3.2.1 Explore hybrid teaching models: Colleges and universities can explore hybrid teaching models, combining online and offline teaching, making full use of various teaching resources and means, and improving teaching effects and learning experience.

3.2.2 Optimize the integration of teaching resources: Integrate various teaching resources, including courseware, videos, online courses, etc., to provide teachers with diversified teaching resources, enrich teaching content, and meet the learning needs of different students.

3.2.3 Conduct innovative research on teaching methods: Encourage teachers to conduct innovative research on teaching methods, explore teaching methods and strategies suitable for online and offline integrated teaching, and improve teaching effects and learning experience.

Conclusion

The integration of the Internet into contemporary higher education has made the online and offline integrated education model a new driving force for the en-

dogenous development of higher education in the context of the digital transformation era. Although the integration of educational information technology and offline classroom teaching is still in the exploratory stage, the borderless and balanced educational resources, the intelligent teaching management based on big data, and the integration of high humanities and high technology [5] have become the needs of the times and the direction of development for the steady progress of the online and offline integrated teaching model.

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DOI 10.34660/INF.2024.88.30.007

新社会经济条件下跨文化交流在技术学生社会和专业形成中的作用
**THE ROLE OF CROSS-CULTURAL COMMUNICATION IN THE
SOCIAL AND PROFESSIONAL FORMATION OF TECHNICAL
STUDENTS IN NEW SOCIO-ECONOMIC CONDITIONS**

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抽象的。国际高等教育机构的发展需要创新的专家培训方法和技术。本文致力于探讨技术大学外国学生的社会和职业形成过程中跨文化交流的本质问题。作者明确了留学生社会职业形成的概念，并确定了其本质和组成部分。本文描述了新西伯利亚国立建筑与土木工程大学通过跨文化交流培养技术学生的社会和职业形成的条件。分析了帮助学生参与不同国际活动并掌握沟通能力的教学条件。

关键词：跨文化沟通、技术学生、社会形成、专业形成、专业沟通能力、国际高等教育、教学条件。

Abstract. *The development of higher education institutions at the international level causes the need for innovative methods and technologies of specialists' training. The article is devoted to the problem of the essence of cross-cultural communication in the social and professional formation process of foreign students at the technical university. The authors specify the concept of social and professional formation of foreign students, and determine its essence and components. The article describes the conditions of the social and professional formation of technical students by means of cross-cultural communication at Novosibirsk State University of Architecture and Civil Engineering. The pedagogical conditions are analysed that help students participate in different international events and master their communication competence.*

Keywords: *cross-cultural communication, technical students, social formation, professional formation, professional communication competence, international higher education, pedagogical conditions.*

The global educational market has been undergoing changes related to global political and economic transformations during the last few years. The export of education becomes one of the most important priorities of the country's policy, since it is not only one of the strategic sources of profit but it is also an instrument of "soft power" or "knowledge diplomacy" [1, 2]. The Russian Federation has been developing and implementing projects to promote the Russian language abroad, and attract foreign citizens to study at institutions of higher education. It has been taking measures to strengthen the importance of the Russian language in different areas, including the humanitarian ones [3].

Training the foreign students at the universities of Russia for their mother countries is an important part of the foreign economic activity of the Russian Federation. As it has taken the course towards creating a positive image of the Russian construction industry, engineering education, and industry science, deepening the processes of integration of education, science, and production, taking into account the priorities of scientific and technological development, and international cooperation [4]. The establishment of joint ventures and the implementation of joint research projects are among the specific results of this activity.

According to the Federal Law, Clause 1, Article 2: 'Education is aimed at the development of an individual, the development of knowledge and skills, and the formation of the competence at certain levels and volumes that allow one to conduct professional activities and create conditions for the self-determination and socialization of students on the basis of social, cultural, spiritual, and moral values adopted in Russian society' [5].

The most important aim of professional education is the formation of a competent specialist with a complex of universal, general professional, and professional competencies in accordance with the requirements of FSES 3 ++. The engineer skills demanded by the employer are the so-called super-professional competencies with the ability to work in a team, set goals correctly, and achieve them; and the ability to work in a multicultural environment.

The need to fulfill the orders of the country, society, domestic and foreign employers forces technical universities in Russia to look for new ways to train future specialists more efficiently.

The formation of personality is also considered a social formation of a person, namely, as a subject of knowledge and activity, when simultaneously the stages of development of the properties of the subject of knowledge and activity, social roles in society pass [6]. Ewald F. Zeer noted: 'The formation of a person neces-

sarily involves the need for development and self-development, the possibility and reality of satisfying it, as well as the need for professional self-preservation' [7].

The problem of human formation in modern education is represented by interpretations as a sphere of society; as a universal way of translating cultural and historical experiences; as a universal cultural and historical formation and development of the essential forces of a person, his family abilities. According to Viktor I. Slobodchikov: 'The anthropological mission of a current education is to establish fundamental needs and abilities in a person, the main of which are the needs and abilities for self-education, and thereby self-development' [8].

By cross-cultural communication, we mean communication between representatives of different cultures: national, religious, family, professional, and social [9]. It can be verbal and non-verbal and can include the use of words, gestures, eye contact, or body language when interacting cross-culturally (Fig.1).

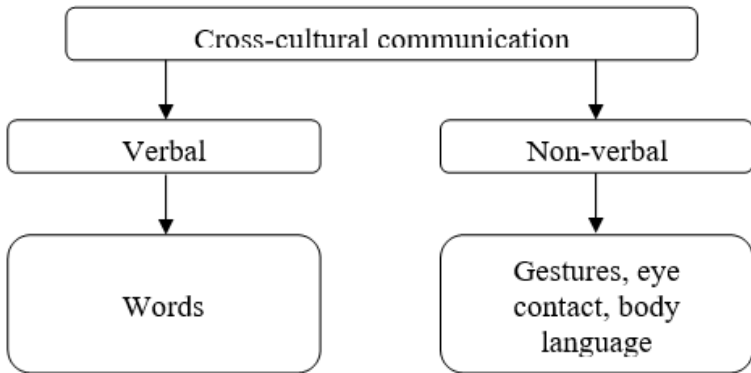


Figure 1. Cross-cultural communication

It is important for students at NSUACE (Sibstrin) to be ready for cross-cultural communication, since foreign students are being trained and international events are held at the university.

The number of foreign students is constantly growing. Since 1978, the representatives of more than 68 countries have been trained at the university: Australia, Asia, North and South America, Africa and Europe.

Today, the university provides training to about 500 foreign students from 29 countries (Azerbaijan, Angola, Bangladesh, Belarus, Vietnam, Zambia, Indonesia, Kazakhstan, Cambodia, Canada, China, Colombia, Costa Rica, Kyrgyzstan, Laos, Mexico, Mongolia, Namibia, Nigeria, Peru, Poland, the Republic of Korea, Sierra Leone, Tajikistan, Turkmenistan, Turkey, Uzbekistan, Ukraine, and Ecuador) (Fig.2).

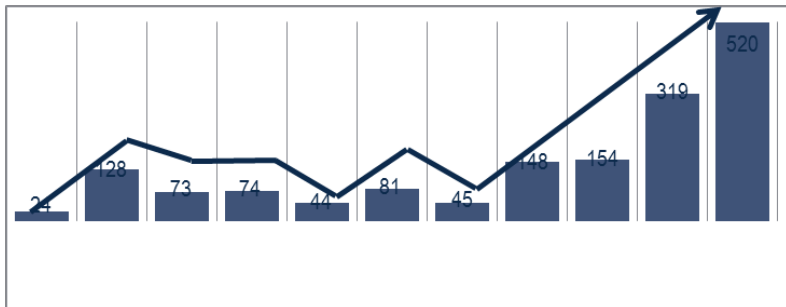


Figure 2. Foreign students at NSUACE (Sibstrin)

The university also carries out international cooperation with different organizations all around the world. At the official site of the university, anyone can become acquainted with the list of organizations the university has cooperated with (Fig.3).



Figure 3. International cooperation of NSUACE (Sibstrin)

In October, 2022, the university held the International Youth School “ECO-POLIS” in two working languages: Russian and English. It was a competition

for green university campus projects. Within the framework of the competition, the following events took place: expert workshops, lectures in the field of energy efficiency and resource conservation, integrated development of territories in the aspect of a circular economy, etc.

More than 230 people participated in the International Youth School “ECOPOLIS”. More than 100 people in an offline format (40 people were the guests from other cities in Russia and 6 countries). The results of the completion are: the eight student projects on green university campuses; the materials of the international school “ECOPOLIS”; and the school videos in Russian and English (Fig.4).

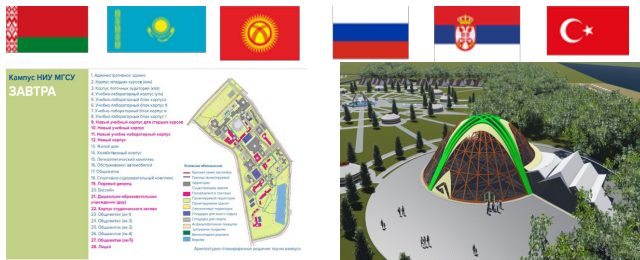


Figure 4. International youth school “ECOPOLIS”

The university has got an experience of cooperating with foreign companies.

- We invite leading specialists to give special lecture courses, conduct master classes;
- Conduct joint technical and training seminars and conferences;
- We send students to industrial practices (in Russia and abroad);
- Trainees can perform final qualification work and its protection in production.

Cross-cultural communication in the social and professional formation of students is a long, phased, sequential, and progressive process that takes place in an integrative-communicative environment with industry specifics, which determines the integrative property of the student’s personality to interact in the language of cross-cultural communication.

In the educational process, the student is an active subject and joins various types of activities in the educational environment of the university, which contributes to personal and professional development. In the context of accompanying a student in the process of communication with subject teachers, a well-coordinated work of a foreign language teacher and subject teachers plays an important role, which contributes to building cross-cultural communication in a foreign-language educational environment.

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DOI 10.34660/INF.2024.83.34.008

白俄罗斯学前教育机构体育和娱乐活动过程中2至4岁儿童音乐感知发展的可能性
**POSSIBILITIES FOR THE DEVELOPMENT OF MUSICAL
PERCEPTION IN CHILDREN FROM 2 TO 4 YEARS OLD IN THE
PROCESS OF PHYSICAL EDUCATION AND RECREATIONAL
ACTIVITIES IN PRESCHOOL EDUCATION INSTITUTIONS IN
BELARUS**

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注解。文章阐明了2至4岁儿童音乐感知的本质。白俄罗斯学前教育机构在体育和健康活动过程中展现了组织2至4岁儿童音乐感知的潜力。

关键词：音乐感知、学前教育、学前教育机构、教育过程、体育和娱乐活动、2至4岁儿童、学前教师、音乐总监。

***Annotation.** The article clarifies the essence of musical perception of children from 2 to 4 years old. The potential for organizing musical perception in children aged 2 to 4 years in the process of physical education and health activities in preschool educational institutions in Belarus has been revealed.*

***Keywords:** musical perception, preschool education, preschool education institutions, educational process, physical education and recreational activities, children from 2 to 4 years old, preschool teachers, music directors.*

In our study, the musical perception of children from 2 to 4 years old is understood as the leading (main) type of musical activity, which consists in the motivated, emotional and meaningful comprehension by children of musical intonations and images that are accessible and attractive to them, and the active manifestation of their attitude towards them in the process of communication with using mastered and preferred languages of self-expression.

In the educational program documentation of preschool education in Belarus, the potential of the educational process of preschool education in the development of musical perception in children from 2 to 4 years old is not stated, therefore, the latent (hidden) potential must be identified and substantiated. The possibilities for developing musical perception in children from 2 to 4 years old within the

educational process of a preschool education institution are wide. This can be promoted within the framework of specially organized activities in classes in all educational areas presented in the curriculum of preschool education in Belarus: «Musical art», «Physical education», «Fine arts», «Fiction», «Child and nature», «Elementary mathematical concepts», «Development of speech and culture of verbal communication», «Development of mathematics and culture of minor losses», «Child and society» [1]. We analyzed the tasks and content of the educational field «Physical education» of junior groups and identified the possibilities for the development of musical perception during its implementation.

The possibilities for developing musical perception when conducting classes in the educational field «Physical education» are great. The music that accompanies these classes creates a certain emotional mood, activates the attention of students, and helps to avoid monotony. Influencing the physiological processes of the child's body, it increases the amplitude of breathing and pulmonary ventilation. N. N. Aksenova claims that music helps sedentary students establish the desired pace and rhythm of exercises and increase physical activity. For pupils with a high level of physical activity, turning on music helps reduce physical activity [2].

You can use music in classes in the educational field «Physical education» in the introductory, main and final parts. The introductory part usually involves walking, running, and drill exercises. When walking and running, you should use fast and slow tempo music to quickly respond to changes in the direction of running or walking, their pace, or unexpected stops. It is also recommended to walk accompanied by marching music to perform clear movements. When conducting gymnastic and game exercises in the main part of the lesson, the use of music will depend on the level of knowledge of the technique of their implementation by the students. If children are not familiar with the exercise and they just have to learn it, then music is not used, because she will be distracting. When students are already familiar with the exercise and have consolidated their performance skills, music can be included in the lesson. This will help create a favorable emotional background, promote interest in accessible forms of physical activity, maintain the desire to participate in exercises, outdoor games with peers and more expressive movements. It is worth noting that exercises that require a high strength load («Boat», «Scissors», etc.) do not require musical accompaniment. Using music with high and low sounds while climbing a gymnastic ladder with a safety net will improve the understanding of the «up» and «down» instructions and facilitate a quick response to the task. For a more accurate understanding of the plot in outdoor games, it is recommended to use music with a variety of available images. When holding Belarusian folk games, it is desirable to use music of the song and dance genres. The use of music of a cheerful, calm nature and a fast, slow tempo will help establish the desired rhythm and pace of exercise, increasing or decreasing

ing physical activity. In the final part of the lesson, it is recommended to use music of a calm nature and slow tempo to normalize the pulse and breathing.

The curriculum of preschool education also presents forms of organizing physical education and health activities for pupils of the first and second junior groups. Thus, physical education and health activities, in addition to classes, include the following forms: organized physical education and health activities: morning exercises, outdoor games and exercise on walks, physical education leisure (second junior group); independent motor activity; joint physical education and health work of preschool education institutions and families [1].

In the process of physical education and health activities, the use of music can promote coordinated and expressive movements, improve children's mood, and contribute to the emergence of interest in this activity. It is recommended to use music during morning exercises. In this case, music can create a cheerful mood in children for the whole day, promote activity in classes and in play activities carried out during the day. Therefore, music during morning exercises should not create long pauses between exercises and reduce the pace of movements. When conducting outdoor games, the use of music is possible when its sound precedes competitions in the speed of catching, running, building, since these movements imply an individual pace and rhythm of execution, less or more energy expenditure for a particular child. For example, in the outdoor game «Who is faster» children first run everywhere according to the tempo, dynamics, and nature of the musical piece, and after it stops, they try to quickly take specific places [3]. The content of physical education leisure may include gymnastic exercises, outdoor games and play exercises, riddles, relay race games, round dance games, songs on physical education topics, etc. The widespread use of music during physical education makes it an emotionally vivid, memorable event in a child's life. Independent motor activity includes a variety of movements that occur on the child's initiative. The child chooses their pace, pauses, and alternates them. When performing movements, a connection with musical activity may arise: the child can repeat with interest an element of dance or dance. By observing children's independent motor activity, teachers can guide and enrich it, taking into account the child's interests. For example, if a child performs elements of dance, a teacher can invite the child to dance to musical accompaniment, show and offer to perform dance movements that are not yet known to the child. As part of the joint physical education and health work of a preschool education institution and a family, teaching staff can formulate among the legal representatives of pupils ideas about the importance of this work using musical accompaniment, expand their knowledge about the child's physical skills, musical performances, and facilitate children's exercises at home together with legal representatives and with musical accompaniment.

Thus, the potential for the development of musical perception in children from 2 to 4 years old in the process of physical education and health activities in preschool educational institutions in Belarus has been identified, which can be realized under certain conditions.

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认知归因模型
COGNITIVE ATTRIBUTION MODELS

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注解。在现代社会心理学中，不确定情境下的人际感知研究引起了人们的极大兴趣。Z. Kunda 和 P. Taggart 提出的“印象形成的并行约束”和“解释连贯性”原则指出了在这种情况下重建和保持个人表征的一致性的重要性。此外，归因中最重要的作用是对个体因果历史的研究。

关键词：归因、因果历史、人际感知、刻板印象。

Annotation. *In modern social psychology, the study of interpersonal perception in situations with uncertain context is of great interest. The principles of “parallel constraints on the formation of impressions” and “explanatory coherence” proposed by Z. Kunda and P. Taggart point to the importance of reconstruction and consistency of individual representations of a person in such situations. In addition, the most important role in attribution is played by the study of the causal history of the individual.*

Keywords: *attribution, causal history, interpersonal perception, stereotype.*

In social psychology, a stereotype is any widely held opinion about certain types of individuals or certain modes of behavior that is intended to represent an entire group of those individuals or patterns of behavior as a whole. These thoughts or beliefs may or may not accurately reflect reality. A. A. Bodalev compared evaluative stereotypes with the “clothes” in which the cognizant person dresses the person who knows him, after he has assigned him to a certain category of people [1].

As G. M. Andreeva points out, stereotyping as the “core of interpersonal perception” can have two different consequences. On the one hand, it simplifies the process of building an image of another person, and on the other hand, it is a source of prejudice and erroneous judgments [2]. Stereotypes, as a rule, serve as prototypes that differ in the level of typicality (for example, the stereotype of African-Americans in the minds of a number of white residents of the United States is closely associated with poverty, lack of education, and crime). Group stereotypes

can guide our expectations of group members and can color our interpretations of their behavior and traits. In this regard, social and ethnic psychology has accumulated a great deal of material devoted to the problems of the formation and actualization of ethnic stereotypes.

For example, it is easy to accept the statement that someone is described as intelligent, shy, hardworking, and short if that person is Asian American, because this view fits stereotypical beliefs. Since the stereotype makes it easier for us to form an impression of such a person, the effort saved in the task of forming impressions can be applied to other tasks.

In relatively uncertain situations, stereotypes can influence the interpretation of the context of a situation and lead to different outcomes. For example, Z. Kunda, a researcher from Canada, studied interpretations of the behavior of an unfamiliar young man from a university campus who sat down next to a bicycle and fiddled with a lock. His work has shown that interpreting a stranger's behavior can depend on their ethnicity. If you point out that this is a Spanish-speaking person, then it is easy to assume that he is trying to steal a bicycle. If it is reported that it is an English-speaking student, it is usually concluded that this person is trying to unlock his own bicycle.

Stereotypes can also influence how we understand the disposition used to describe personality. When we see a lawyer, whose behavior can be noted as aggressive, we tend to characterize him as a sarcastic and ironic person. In contrast, when we hear a construction worker described as aggressive, we assume that this worker is shouting insults during an argument in a bar. Although lawyers and construction workers are seen as equally aggressive people, the subjects believed that their aggressiveness would be expressed in different ways.

Similar patterns were found in the works of this author and when comparing imaginary behavioral scenarios in the same situation among representatives of these social groups. For example, the subjects were asked to reconstruct in detail a situation in which one of the attendees was critical of the protagonist's marriage and mocked his wife. In the first case, it is assumed that the protagonist is a construction worker named John, and in the second case, John is presented as a lawyer. When these tasks were given to two different groups of subjects, it became clear that both groups had envisioned completely different scenarios. As a rule, the builder tends to use physical force, while the lawyer resorts to reasoned objections [3].

In general, it can be stated that when we have any detailed information about a representative of a particular stereotype, we judge the personality of this person only by specific information, and not by the stereotype. But a stereotype can nonetheless color our judgments of a person because it can determine how we understand and interpret individualizing information.

A. A. Bodalev compared the process of an individual's cognition of another person with "the solution of a psychological problem to which he can give both the right and the wrong answer" [1, p. 136]. In this regard, the model of parallel constraint satisfaction model of impression formation by Z. Kunda and P. Targart, which suggests that in the course of the integration of impressions about an individual, there can be a parallel reassessment and rethinking of individual ideas about this person.

For example, your impression of someone you know may be a combination of personality traits (friendly, independent), behavior (a joke told), and social stereotypes (a woman, a doctor, a Chinese). The authors of this model point out the important role of the explanatory coherence principle in the process of attribution, and provide the following example as an illustration. For example, we experience dissonance when we learn that someone who is a lawyer has parried insults in a very restrained manner. Any mechanism for attributing a person involves an assessment of the degree of consistency of data about a person.

Suppose, for example, that a normally well-meaning acquaintance yells at you. Various hypotheses explain this behavior: perhaps this woman has had a stressful day at work, or she has stopped taking some necessary medications, or she has learned some terrible fact about your personality. To attribute her actions, you'll construct an explanation that depends on what best fits your beliefs and perceptions of the person.

The most important role in assessing the consistency of ideas about a person is played by the principle of causal history described by B. Malle, who is the author of the "folk theory of attribution". He agrees that humans spontaneously explain behavioral and social events. This fact has led to many insights in the domains of social influence, self-regulation, relationships, and health. However, at present we must acknowledge that traditional formulations of attribution theory either focused too narrowly on inferences of stable traits or oversimplified the complex nature of behavior explanations [4].

According to this researcher causal history as a certain set of concomitant circumstances (mood, cultural and personal characteristics) and the "causal background" of an individual is the most important explanatory principle of behavior. This factor does not provide an opportunity for adequate and detailed prediction of behavior, but rather inscribes the behavior of the observed individual (target) into the general cause-and-effect chain. At the same time, causal explanations have an implicit, reduced character and are closely related to the so-called "mental markers" that perform important social functions by conveying various shades of meaning (interpersonal relations, self-presentation, etc.). So, according to this folk-conceptual theory, people's explanations of behavior cannot be properly understood when categorized as "person" or "situation" causes. Rather, they fall into

multiple distinct modes (causes for unintentional behaviors and reasons, causal histories, and enabling factors for intentional behaviors) [5].

In this regard, it is impossible not to note the close relationship between the principles of explanatory coherence and the model of folk attribution with the problem of social intelligence. For example, J. Kihlstrom and N. Cantor point out the important role of implicit representations of other people associated with representations of personality embodied in narratives about a person's actions and experiences.

According to them, social intelligence is specifically geared to solving the problems of social life, and in particular managing the life tasks. The intelligent nature of life-task pursuit is clearly illustrated by the strategies deployed in its service. They note that much of the cognitive activity in life-task problem solving involves forming causal attributions about outcomes, and in surveying autobiographical memory for hints about how things might have gone differently [6, 7, 8].

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DOI 10.34660/INF.2024.43.35.010

半职业冰球运动员心理支持的内容
**CONTENT OF PSYCHOLOGICAL SUPPORT FOR SEMI-
PROFESSIONAL HOCKEY PLAYERS**

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抽象的。本文介绍了半职业冰球队心理支持内容的基本原理。显示了半职业冰球运动员个人活动风格的特殊性、活力组成部分（参与、控制、冒险）的发展水平以及冰球运动员对体育活动的满意度。

关键词：个人风格、半职业曲棍球运动员、体育活动、复原力、心理支持、运动队、工作满意度。

Abstract. *This paper presents the rationale for the content of psychological support for a team of semi-professional hockey players. The specificity of individual styles of activity of semi-professional hockey players, the level of development of the components of vitality (involvement, control, risk-taking) and satisfaction with the sports activities of hockey players are shown.*

Keywords: *individual style, semi-professional hockey players, sports activity, resilience, psychological support, sports team, job satisfaction.*

Successful performance in competitions depends not only on the level of high physical, technical and tactical preparedness of the athlete, but also on his psychological readiness. In order to realize their abilities, skills, and abilities, as well as to reveal personal potential as a mandatory element of competition, an athlete needs to psychologically prepare for certain conditions of sports activity [1,2,4,5,6,8,9]. Psychological support “helps to increase the effectiveness of all types of training for athletes, providing preparation for performance, realization of the athlete’s psychological potential and satisfaction of his needs in activity; development of self-knowledge and self-regulation skills; increasing self-esteem;

establishing relationships with team members and the coach” [8, p. 340]. Psychological analysis of sports activity (A.Ts. Punina, V.A. Demina, A.V. Rodionova, O.V. Dashkevich) made it possible to identify such components in the subject’s activity as a motive, defined as an object of need; the purpose and conditions for the implementation of the action [4, p. 619-620]. The process, considered from the side of motive, is special and dynamic, since there is a change in the motivational sphere of the athlete at each stage of sports activity; on the part of the goal - as an action; on the part of the condition, the implementation of the action is as an operation, the implementation of which occurs through “executive” mechanisms that implement activities, including joint ones. A sports team is a team characterized by common goals, motives, and actions. Team sports place great responsibility on each player, which cannot but affect the mental state of the athletes. The result of the team’s activities depends on the specifics of the “individual style of activity.” This concept was introduced by E.A. Klimov: “...an individual system of techniques and methods of action, which is characteristic of a given person and ensures the achievement of successful results” [3, p. 74-75]. An individual style of activity should be understood “not as a set of individual properties, but as an expedient system of interrelated actions, with the help of which a certain result is achieved” [3, p. 270]. A person, with a variety of types of activity, may have several styles of activity. Considering sports activity as a priority for respondents, we assume that “in the process of team play, the individual style of activity of team members can be adjusted in order to compensate for the styles prevailing in the team” [8, p. 341].

Materials and methods.

The purpose of the study is to determine the content of psychological support for a team of semi-professional hockey players. A survey was conducted in the national team of hockey players on the basis of the sports organization of the city of Surgut. To determine the style of activity that prevails in a team of semi-professional hockey players, we used the “Questionnaire of Activity Styles” developed by A.D. Ishkov and N.G. Miloradova based on the “Learning Styles Questionnaire” by P. Honey and A. Mumford. To determine the overall level of satisfaction with activities and the level of resilience, the subjects were offered: the “Integral Job Satisfaction” method by N.P. Fetiskin [7] as adapted by the authors; “S. Muddy’s vitality test (adapted by E. Osin and D. Leontyev)” [5].

The study involved 10 semi-professional hockey players (current team composition). The respondents’ age ranged from 18 to 24 years. The experience of semi-professional hockey players in sports activities ranges from 5 to 19 years. Level of education – general secondary education, higher professional education (bachelor’s, master’s).

Results and discussion.

Diagnostics of activity styles determined the predominance of the “Theorist” activity style (Figure 1). The tendency for the “Theorist” style to manifest itself indicates that each of the subjects, for the most part, is rational and objective, which, in turn, is an important quality for an athlete. Theorists analyze life experience and, based on a generalized analysis, formulate a strategy for their actions.

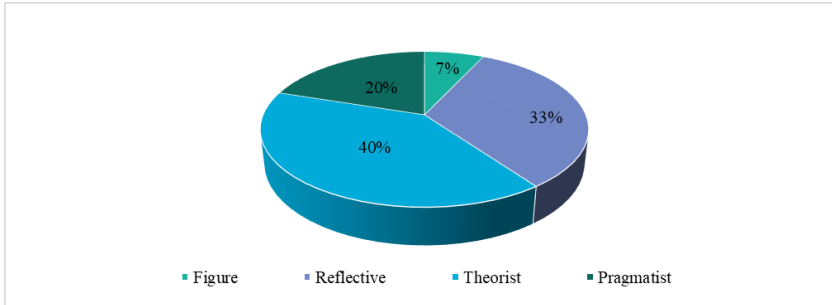


Figure 1. Results of the “Activity Styles Questionnaire, LSQ”

An analytical mindset is important in such a form of sports activity as hockey, so the results tell us that our players are characterized by a deep analysis of their actions and actions. Thus, the degree of manifestation of the “Theorist” activity style is an indicator that among these semi-professional hockey players, people who are aimed at analyzing complex situations predominate, the choice of which falls on structured activities that have clearly defined goals. The second styles in terms of frequency of occurrence were styles such as: “Reflective”, “Pragmatist”. The “Reflective” style of activity involves diligent selection and analysis of data, which, in turn, involves postponing decisions. Since hockey is a team sport, a set of special playing techniques that have a unique structure, tactics are important for a hockey player, which he explores during his sporting activities. The discrepancies between the “Theorist” and “Pragmatist” styles may mean rapid switching during the implementation of one’s actions related to sports activities, for example, switching the choice in favor of theoretical or practical knowledge and skills. Sometimes it is important to approach the issue theoretically and analyze your actions in detail, and sometimes the priority is the speed of applying theoretical knowledge in practice. There is a tendency - the younger the athlete, the more types of activity styles become relevant. For example, athletes aged 18 years have the same number of points in 3 types of styles, which may indicate a search for means of adaptation to a sports team. In addition to this, it was important to determine satisfaction with sports activities (Figure 2). According to testing

of semi-professional hockey players, it was found that 80% of team members have a high level of satisfaction.

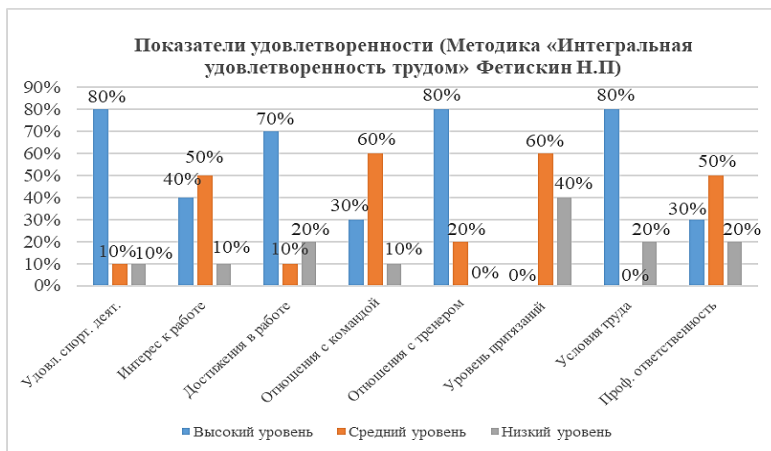


Figure 2. Satisfaction indicators (“Integral job satisfaction” Fetiskin N.P. in the author’s adaptation)

At the same time, it draws attention to the predominance of a low level of aspirations in sports activities - 40% of respondents demonstrate a low level; more than half of the respondents have an average level of satisfaction with relationships with team members; average level of professional responsibility (50%). This situation can cause unproductive sports activity and reduce the level of motivation and interest. Therefore, it is advisable to include in psychological support work to increase the level of aspirations in sports activities.

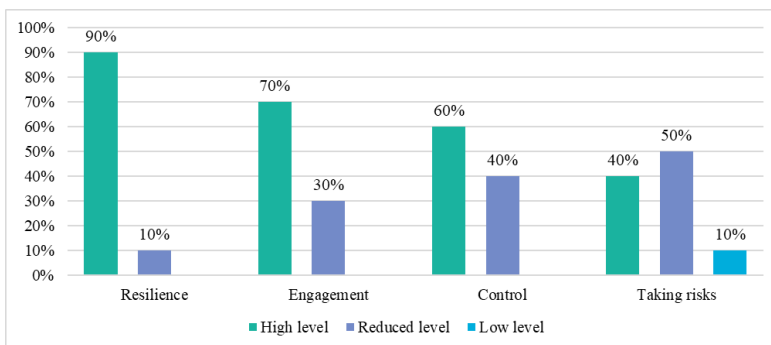


Figure 3. Results of the “S. Muddy Vitality Test”

One of the markers of sports activity is the lability and adaptability of athletes; an indicator of these qualities is vitality. D.A. Leontyev and E.I. Rasskazova defined resilience as “a measure of an individual’s ability to withstand a stressful situation, maintaining internal balance and without reducing the success of activities” [5]. The study group is characterized by a high level of resilience. It is much easier for such people to overcome difficulties, make constructive decisions in a problematic situation, they are sociable, find a common language more easily and are open to others. The involvement of hockey players in sports is the driving force of an athlete’s activity. A high and average level of involvement indicates that the student is satisfied with his sports activities. High and medium levels of control determine the presence of confidence in oneself and one’s abilities. Risk acceptance is based on the athlete’s expressed ability to be aware of his actions and decisions made, but at the same time be aware of the degree of risk in a particular case.

Thus, as a result of an empirical study, semi-professional hockey players were found to have a tendency to display the “Theorist” style of activity and a prevailing high level of resilience. Moreover, most athletes have the same level of 2-3 styles of activity. This situation indicates the ability to adapt (choose) the style of activity for building a game strategy in a team. Based on the analysis of the results, it can be noted that the team’s activities reveal problems of an organizational nature related to interpersonal relationships and the prospects for the team’s development, respectively, and the level of responsibility. It was revealed that team members, on a personal level, are characterized by a high level of resilience, characterizing athletes as confident in their abilities, able to control themselves, and involved in activities. At the same time, semi-professional hockey players strive to avoid failures and remain in their comfort zone. Athletes demonstrate a high level of overcoming unfavorable conditions, as well as high resistance to stress factors.

Conclusion.

As a result of the work carried out, we identified the main directions of psychological support for semi-professional hockey players: increasing the level of aspiration in sports activities through joint planning of competitions and building communication with various organizations; increasing the level of professional responsibility; build relationships with team members; team building taking into account individual operating styles. Moreover, the constituent components of vitality can serve as a kind of compensatory mechanism. Psychological support for athletes is an important component of the personal and professional development of athletes.

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DOI 10.34660/INF.2024.83.16.011

回到历史。 朱利叶斯·波斯图穆斯
BACK IN HISTORY. JULIUS POSTUMUS

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概括。 士兵皇帝的时代创造了条件，在这种条件下，每一位宣布称帝的皇帝都渴望让儿子直接延续王朝，儿子要么获得凯撒头衔，要么成为父亲的共同统治者，获得奥古斯都头衔。 公元第三年中期，作为解决中央政府政治不稳定的最可能的答案，各省的分裂。 高卢和日耳曼尼亚上下的总督就这样被宣布出来，领导着“高卢帝国”。 自古以来的史学中，就一直有关于高卢第一位皇帝的儿子尤利乌斯·波斯图穆斯的存在的讨论。 然而，一枚硬币的图像不仅提出了该假设权力的继承人的问题，而且还提出了他的家庭的问题。

关键词：高卢帝国、罗马帝国、铸币传说、图像学、罗马皇帝瓦莱里安努斯、加利努斯、高卢皇帝波斯图穆斯、尤利乌斯·波斯图穆斯、高卢皇帝。

Summary. Epoch of soldier's emperors created conditions under which each proclaimed emperor aspired to provide direct continuation of the dynasty in the person of the son who either received a title of Caesar or became co-ruler of the father with a title Augustus. In the middle of the III A.D. As the most possible answer to the political destabilization of the central government, the secession of the provinces. This is how the governor of Gaul and the Germania Superior and Inferior were proclaimed, leading the "Gallic Empire". In historiography since the epoch of antiquity there was a discussion about the existence of Julius Postumus, the son of the first Gallic Emperor. However, the iconography of one coin raises the question not only of the heir to the power of the postulate, but also of his family.

Keywords: Gallic Empire, Roman Empire, legend of coinage, iconography, Roman Emperor Valerianus, Gallienus, Gallic Emperor Postumus, Julius Postumus, the Gallic Emperors.

The tragic events of the middle of the third century brought the Roman Empire to the brink of destruction. An endless succession of emperors, internal forces – the Senate and the army – tore apart the empire, putting forward their own de-

mands and being guided in politics only by their own interests. It was precisely to these interests that the proclaimed emperors had to correspond, who were assigned the role of a kind of puppets, “caliphs for an hour” solely for the sake of promoting the above-mentioned interests, to obtain new lands, new resources, new money distributions, new booty. Therefore, any failure in politics, delay in reforms, or loss in the military field was perceived as a failure of the emperor himself.

Against this background, of course, there were emperors who sought to change the situation, to take control, or to reconcile the opposing forces of the Senate and the army, or to deprive one of them of the powers. But such emperors were of no use to those who were guided only by their own interests, although they could save the empire without plunging it into the abyss of crisis.

The separatism of the provinces during this period is only a reflection of what was happening in the empire, a kind of response, an attempt to defend itself.

The emperors Valerian and Gallienus, having divided the powers of governing the empire, sent Caesar Valerian II to the Danubian Limes, where he was killed during the rebellion of Ingenui, to protect the Limes and create a new system of government. By that time, Emperor Valerian had already gone to Antioch to wage war against Shapur I, who laid claim to the eastern territories of the Roman Empire, primarily Mesopotamia and Armenia. However, it was important for Gallienus that such a Danubian revolt should not be repeated, so he sent his second son to the Rhine Limes under the guardianship of the praetorian prefect Silvanus. It was the actions of the latter, either independently or on the orders of Gallienus, who did not trust the governors appointed by Valerian, that led to the revolt of the legions at the Colonia Agrippina (Köln) and the murder of caesar Saloninus and prefectus pretorio Silvanus. It was then that the first Gallic emperor, Marcus Cassian Latinus Postumus, was proclaimed.

After 10 years of rule, Postumus, who had devoted all his energies to stabilizing the political and economic situation of the regions that became part of the Gallic Empire, strengthening the Rhine limes and the defensive system, was killed under the walls of the rebellious Mogontiacus (Mainz) by soldiers, to whom he refused to give the surrendered city to be plundered.

Trebellius Pollio reports that his son was killed along with the first Gallic emperor. For this period, this situation seems quite ordinary. Beginning with Marcus Aurelius, emperors tried to make power hereditary, transferring power not to the adopted son, but to their own son, granting them the title of Caesar or Augustus. In conditions of political instability, the most correct solution was to share power with his son to receive an oath of allegiance from the troops and other political forces. This was even more necessary because the emperors, thus ensuring the continuation of the dynasty, endangered their own offspring, who, in the event of a revolt, would prove to be a hindrance to other proclaimed pretenders. But even

such precautions did not save the heirs. Thus, Macrianus Maior, in the struggle for power and, as ancient authors mention, by his cruelty brought his son to death (SHA, XIX. 19, 24], the fate of the sons of Gallienus has been mentioned above, but, in fact, they too were victims, with whose death the line of the reigning Roman emperor was to be interrupted to establish a new dynasty. Under these circumstances, the last Gallic Emperor Tetricus did everything to save his life and the life of his son, finding support in time and accepting the capitulation from the stronger party, Emperor Aurelian, sacrificing the lives of those who were preparing for the decisive battle for the “Gallic Empire” (SHA, XXIV, 24-25).

The late antique historiographical tradition, as if according to some kind of pattern, placed next to the name of the emperor the sons who had to be by his side in order not only to study, but also to gain authority with the legions they were to command. After all, in most cases, it really corresponded to reality. Like, say, Gordian III, the grandson and probably son of previous rulers, who was proclaimed by the legions after the Senate’s failed attempt to enthrone its protégés. The reason for the appearance of often fictitious heirs was most likely the desire to make the figure of the described emperor more significant, and, conversely, the absence of an heir and the desire to appoint him testified to the insignificance of the proclaimed emperor and the time of his reign. Thus, a few usurpers of middle III A.D. “remains” in the biographies of the Roman Augusti without heirs to his power. For example, the Gallic emperor Marius, whom modern researchers recognize as more of a rebel [3, c. 460], who ruled for only a few months. Sometimes the names of the heirs are changed, probably for better sounding, for example, in the anonymous historian there are “two Odaenathus” (Anonym., fr.7).

And it is with the sons of the so-called usurpers that many controversial questions sometimes arise the authors of the Biographies of the Augusti mention Postumus Minor, Victorinus Minor, and Tetricus Minor.

And if the existence of Julius Postumus and Victorinus Minor is more like a legend, then Tetricus II is a real historical person, whose life is confirmed by the inscriptions and iconography of coins and coin legends, according to which he shared consular powers with his father (Elmer, nn. 770, 774, 821, 842, 859; 6, Tetric. I, 41, 80, 126-127). Of particular interest is the coin with the profile of Tetricus I on the obverse and Tetricus II on the reverse (RIC, Tetric. II, 202).

A very controversial point concerns Julius Postumus (Postumus Minor). Such a mature man as Marcus Cassian Latinus Postumus, at the time of his proclamation as emperor, had a family and children. Since the time of Septimius Severus, it has been possible for soldiers to officially marry or keep those that already existed at the time of joining the Roman legion. That is why many generals are mentioned together with their sons, who, apparently, were early accustomed to the difficulties of a soldier’s life and were given the only reliable opportunity to feed their families - to enlist in the army.

From the sources, the following becomes known. Trebellius Pollio mentions Julius Postumus in only two chapters, the first Gallic emperor and Postumus Minor himself. What can we learn from the scant information we have at our disposal? Since Julius Postumus is called “*adulescens*” (SHA, XXIV, 3), it may be concluded that he was fourteen or more years of age. It is also mentioned that he was trained in eloquence and was also appointed to a position, which increases his possible age to 16-18 years. Trebellius Pollio also says that Postumus Maior made his son co-emperor and official heir, granting him the titles of Caesar and then Augustus. However, the above-mentioned office, which, according to the testimony of the ancient author, was allegedly granted to him by Valerian himself, is “*tribunatum Vocontiorum*” (SHA, XXIV, 3) is clearly fictitious. The Vocontii are a Celtic tribe that Julius Caesar encountered during the conquest of Gaul, and then this tribe is found in the “*History*” of Tacitus, finding themselves in the centre of the military-political struggle of Vitellius, Otho, and Valens. Also clearly is the above letter, written by the emperor Valerian before his departure for the East, wholly or partially fictitiously. In the same source, there are two versions of his fate after the death of Postumus Maior: one is that he was immediately killed together with his father (SHA, XXIV, 4), according to another, managed to lead the “*Gallic Empire*”, but apparently was soon killed as well (SHA, XXIV, 6).

However, this is the end of the information about Julius Postumus. In other sources, there is no mention of the son-heir of the first Gallic emperor. In contrast to the above-mentioned Tetricus Minor, we do not know of any inscription relating to Julius Postumus. And even Trebellius Pollio, who usually likes to introduce various, mostly fictitious, epigraphic data into biographies, prefers to remain silent in the case of Julius Postumus. There were attempts to falsify the inscription to prove the existence of Julius Postumus, however, as the German researcher Ingmar König points out, this was quickly exposed by scientists [2, s. 136].

As for numismatic data, it was they who gave a new impetus to the question of the existence of Julius Postumus. Coins minted in honor of Julius Postumus, with his name and title, have not been found now. However, having paid attention to one coin with the legend *AETERNITAS AVG* (RIC, Postum., 18d), it was worth taking a closer look at the three busts in ray crowns placed on the reverse. M.G. Abramzon¹ in a personal consultation, he suggested that one of the busts could be an image of Julius Postumus. The central bust, arranged in full face, is female and may most likely depict the goddess Diana, worshipped in the “*Gallic Empire*”²,

¹ I would like to express my gratitude and appreciation to M.G. Abramzon for his advice and advice.

² It is rather absurd to suppose that these images symbolize the three provinces of the “*Gallic Empire*” - Gaul, Britain, and Spain. Firstly, where did the two Germania and the Limes, controlled by the Gallic emperors for almost the entire period of the existence of the “*Gallic Empire*”, go, and secondly, at the present stage of the development of science, the fact that the province of Rhaetia

although there has been speculation that this may be the wife of Postumus Maior, or at least her depiction as a goddess (RIC, p. 327). Two other portraits are placed in profile and resemble two young men, slightly different in appearance, but at the same time, very similar. It has been suggested that one of these young men may be Victorinus Minor [ibid.], but the sources indicate (with all doubts about his existence at all) that he was killed together with his father when he was a boy – “puer” (SHA, XXIV, 4, 3), while the coin minted at Lugdunum can most likely be dated to the mid-60s of the third century, since this mint ceased to function at the end of the reign or immediately after the death of the first Gallic emperor.

The only assumption in this case that can be made based on all the above is that Julius Postumus was indeed a real historical person, but died, as evidenced by the legend itself and its placement on the above coin, where AETERNITAS is located along the curve of the coin disc, and AVG is just below in the centre near the three images. In this case, the central image may be a portrait of the wife of Postumus Maior, and the other two busts in profile are of Julius Postumus, opposite which is a portrait of his sister and the daughter of the first Gallic emperor. At the same time, the similarity of the two teenagers depicted in profile is also noticeable. The mention in the legend of the title of Augustus in the singular also has its own explanation. This is only a confirmation of the words of the ancient author about the bestowal of this title by Postumus Maior on his only son-heir (SHA, XXIV, 3), while his wife and daughter were not awarded such titles.

The idea that this coin might depict the family of the first Gallic emperor had previously been very cautiously expressed by some researchers but was not accepted. Now, however, the fate of the family of Marcus Cassian Latinus Postumus has become somewhat clear.

Confirmation of the earlier death of Julius Postumus can also be seen in the fact that in 264, during the punitive campaign of Gallienus against the “Gallic Empire”, Victorinus went over to the side of Postumus, who soon became the tribune of the Praetorians under the first Gallic emperor, then his right-hand man, was a colleague in the consulship, and soon, probably, Victorinus shared power with Postumus (RIC, Postum., 160). This could have happened precisely if the son-heir of Postumus had died, and the other children, if any, were either unendangered by the first Gallic emperor or were girls. The French researcher M. Bouvière-Ajam, without denying the existence of Julius Postumus, believes that Postumus did not see his son as a successor to his power, which is why he brought Victorinus closer to him [1, p. 166], who belonged to the highest Gallic nobility. It is possible that he may have been related to the first Gallic emperor, who was supported by the

belonged to the “Gallic Empire” is accepted without any reservations, at least during the reign of Postumus. It is also important that the provinces had equal status and were named in the feminine gender, while on other coins the images are clearly of different ages and genders, in addition, they also differ in the size of the busts. [4].

Gallic aristocracy immediately after the proclamation, and his mother Victorinus - Vitruvia or Victoria, had great influence and authority in the “Gallic Empire”. It is not for nothing that Postumus, who originally planned to place the capital of the “Gallic Empire” in Colonia Agrippina, which was chosen by the emperor Valerian to change the system of government, made Augusta Treverorum (Trier), the city of the rich Gallic nobility, the capital. It was here that the mint, the residence of the Gallic emperor and the main administrative institutions were located. Archaeological evidence suggests that from the beginning of the reign of Postumus, this city grew significantly, and defensive fortifications were erected to protect it. Wealthy Gallic landowners contributed to the financing of all of Postumus’ measures, apparently paying taxes to his treasury and supporting his reforms. It is also known that an important part of the armed forces of the first Gallic emperor was the Gallic cavalry, which was later under the personal command of Victorinus. It is likely that Julius Postumus shared power with his father for a while, but after his death, when the question of an heir to the throne arose, it was Victorinus who could become co-ruler of Postumus Maior. This is a question that is certainly worth returning to.

Thus, it can be said that Julius Postumus did exist, but was not killed with his father, but probably died much earlier. The confusion of the events of the middle of the third century has long been noticed by later ancient authors, so the author of the fourth century could have known about the family of the first Gallic emperor, but did not have at his disposal the details, which is the reason for the not quite clear references to the co-reign of Postumus Maior with Julius Postumus, then with Victorinus. In any case, the three busts on the coin (RIC, Postum., 18d) are the wife, daughter, and son of Postumus Maior, associated with deities: the wife is the goddess Minerva, and the children looking at each other are so similar but as if opposed to each other - Diana and Sol (or Apollo).

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Source abbreviations

Anonym. - Anonym, fr. 1-9 // FGH. 1885. Vol. IV. P.191-199.

Elmer - Elmer G. Die Münzprägung der Gallischen Kaiser in Köln, Trier und Mailand. Bonn, 1941.

RIC - The Roman Imperial Coinage: in 6 tt. / H.M.A. Mattingly, E.A. Sydenham, P. Webb. London, 1968. T.V, part 2.

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俄罗斯史学中的热月反应: 历史的相似性和革命经验的连续性
**THE THERMIDORIAN REACTION IN RUSSIAN
HISTORIOGRAPHY: HISTORICAL PARALLELS AND
CONTINUITY OF REVOLUTIONARY EXPERIENCE**

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注解。 文章分析了法国大革命和俄国十月革命之间革命经验可能的连续性。该研究的重点是研究的两个组成部分——布尔什维克对法国革命经验的运用, 以及对十月革命中可能发生的热月反应的分析。 这项研究的新颖之处在于试图揭示法国革命和十月革命之间的客观相似之处。 这项研究的意义在于, 对于十月革命中法国革命经验的连续性问题, 缺乏统一的态度。

关键词: 巴黎公社、十月革命、热月反动、革命连续性。

Annotation. *The article analyses the possible continuity of revolutionary experience between the French Revolution and the October Revolution in Russia. The study focuses on two component parts of the research – the use of French revolutionary experience by the Bolsheviks, and the analysis of a possible The Thermidorian Reaction in the October Revolution. The novelty of the study lies in the attempt to reveal objective parallels between the French and October revolutions. The relevance of the study lies in the fact that there is a lack of a unified approach to the issue of the continuity of the French revolutionary experience in the October Revolution.*

Keywords: *Paris Commune, October Revolution, The Thermidorian Reaction, revolutionary continuity.*

The Soviet historiography adopted the view that the revolutionary events in France in the late 18th century led to the growth of national self-consciousness and the development of bourgeois relations in many countries of Europe. Modern Russian historiography partly maintained the view to this day in.

English historians Nick Pelling and Robert Palmer believe that the Irish Rebellion of 1798 led by Theobald Wolfe Tone was a consequence of the French revolutionary events. The rebellion itself is considered to be the basis of modern Irish republicanism, and it is also suggested that these events partly led to the partition

of Ireland and partial independence from the British Crown [17, pp. 5–10; 16, pp. 491–508]. In addition, modern Western European historiography considers that the Kingdom of Denmark influenced by French bourgeois-liberal ideas voluntarily implemented a number of reforms in 1750–1780, which led to the formation of a liberal-constitutional system in the state [11, p. 234].

The French revolutionary experience of the late 18th century and the third quarter of the 19th century served as a kind of theoretical and practical foundation for the development of public opinion in the Russian Empire. It can be noted that the Russian state at the turn of the 19–20 centuries experienced similar crisis tendencies as France at the turn of the 18–19 centuries. According to K. Marx's formational approach, the difference between one revolution and another lies in different transitional formations: France was moving from feudalism to capitalism, Russia – from capitalism to socialism. This was noted by V.I. Lenin himself, who recognized the French Revolution as an event that marked the end of the feudal era and the beginning of a new period in human history – capitalism [2, p. 195]. The leader of the Russian proletariat defined the October Revolution as a new qualitative stage in the future world revolution: «at the present moment we are approximately at the level reached in 1793 and 1871. We can be legitimately proud of having risen to this level, and of having certainly, in one respect, advanced somewhat further, namely: we have decreed and introduced through out Russia the highest type of state—Soviet power» [5, p. 175]. Thus, the Bolshevik leader recognized the continuity with the French «colleagues» and noted that the Bolshevik party was able to achieve what the Paris communards had failed to achieve in 1871.

In our study, it is necessary to specify the range of sources that are the articles of the direct participants of the revolutionary events in Russia, which have parallels between the revolutionary events in France and Russia. First of all, I will use the publicistic works of the leaders of the Bolshevik Party – V.I. Lenin, as well as I.V. Stalin, since it was they who drew parallels between the revolutionary events in France and Russia in their articles. The choice of articles by these two leaders of the Soviet state is based on the following facts. In the political system of the Soviet Union, V.I. Lenin was not just a leader and founder of the party, but he was an ideological guide, who set the main trends in public and scientific-historical opinion during his lifetime and after his death. Stalin, on the other hand, declared himself the Lenin's successor, his disciple, who developed the ideas of the immortal leader after rising to power. That is why Lenin's and Stalin's articles can be considered as primary sources in Soviet and Russian historiography, because they were referred to by subsequent generations of Soviet and Russian historians who analyzed the revolutionary events in France and Russia.

In addition, it is also worth referring to the articles of the ideological opponents of the Bolsheviks – Y.O. Martov and P.N. Milyukov – who were among the first

to write about the possible impending «Thermidor» of the October Revolution. In addition to the articles of these publicists, no less interesting are the works of L.D. Trotsky, who gave his understanding of the Thermidorian Reaction. It is also worth referring to the works of those historians who have already partly touched upon the theme of the use of French revolutionary experience in the October Revolution by the Bolsheviks.

The issue of the use of French revolutionary experience has already been partly developed in Russian historiography in terms of national symbols, as well as in Western historiography in terms of mass celebrations. The Russian historian B.I. Kolonitsky developed the topic of what symbols of the French revolutions were borrowed by Russian revolutionaries during the two revolutions of 1917 [12]. In his work on this topic, the historian mainly referred to the personal records of those who directly witnessed the unfolding revolutionary events in St. Petersburg in 1917. Among such sources, the historian highlights the memoirs of the Swedish Social Democrat K.J. Branting, the letters of the Spanish ambassador, and the personal notes of the writer A.M. Remizov. Among the symbols of the French revolutions B.I. Kolonitsky marked the Red Flag, and the German historian M. Rolf also comprehensively analyzed the meaning of the French revolutionary anthem Marseillaise [19].

The given data of the Russian historian allow to come to the general conclusion which consists that the Red Flag after the February revolution actually became a new national symbol: «...they were hoisted over the academy of arts, and over palaces of great princes, they fluttered over government institutions, and over buildings of banks. Red flags were also hoisted on tenement buildings..... The red flag was also hoisted over the Winter Palace...» [12, p. 232]. This suggests that the use of the Red Banner by the Bolsheviks was not unique, as completely different revolutionary forces also used it as a symbol of revolutionary events. The representatives of the Bolshevik Party themselves perceived the Red Banner as a sacred symbol of the proletarian revolution [22, p. 564], which they endowed it with after the events of the Paris Commune of 1871 [21, p. 336]. All these facts show that the Bolsheviks remembered and honored the memory of the French revolutionaries, trying to build a certain continuity with them, to become a kind of continuators of their cause.

Discussing the subject of the revolutionary anthem Marseillaise, it is worth saying that this symbol of revolutionary events, as well as the Red Flag, were not of primary importance to the Bolsheviks. The revolutionary hymn «Marseillaise» itself received the status of an international revolutionary hymn after the events of 1848–1849, which in Russian historiography are called «Springtime of Nations». Undoubtedly, it is worth saying that the «Marseillaise» was created in France, and there it became one of the symbols of the French Revolution of 1789-1793, but in

Russian specifics it was modified due to one of the theorists of narodnik movement L.P. Lavrov, who created his own lyrics and put it on the music of the «Marseillaise». According to the decision of the Provisional Government of 6 March 1917 [14, p. 618], it became the official anthem of Russia until 10 (23) January 1918, when the Council of Peoples' Commissars decided to approve «The International» as the official anthem of Soviet Russia [10].

To summarize, we can say that the Red Flag was a common symbol of the February Revolution and has an indirect relation to the Bolshevik Party. In addition, the leaders of the Russian Social Democratic Workers' Party (Bolsheviks) themselves in their journalistic articles very little focused their attention on such symbols of the French revolutions, which suggests that this topic was not of primary importance to the leaders of the party.

In addition to the topic of state symbols, it is necessary to touch upon the sphere of creating the state apparatus in the Soviet Union, specifically the continuity of the creation of the Soviet system. The first attempt to create a system of soviets was implemented during the years of the Paris Commune, as K. Marx first wrote about, calling the commune a «government of the working class» [15, p. 52]. The same idea was confirmed by F. Engels, directly calling the Paris Commune the dictatorship of the proletariat [15, p. 14]. The leaders of the Bolshevik Party themselves did not share this opinion, V.I. Lenin recognized and appreciated the experience of the Paris Communards, but highlighted two mistakes that, in his opinion, they made: «The proletariat stopped halfway: instead of embarking on the «expropriation of expropriators» it became carried away by dreams of establishing the highest justice in a country united by a national task; institutions such as the bank, for example, were not taken, the Proudhonists theories about «fair exchange» etc., still prevailed among the socialists. The second mistake is the excessive generosity of the proletariat: it was necessary to exterminate its enemies, but it tried to morally influence them» [7, p. 452]. Nevertheless, criticizing the Paris Commune for its lack of rigidity, during the February Revolution, the Bolshevik leader directly compared the Petrograd Soviet of Workers' and Soldiers' Deputies with the Paris workers' government: «They get off with phrases, keep silent, dodge, congratulate each other a thousand times on the revolution, not wanting to think about what the Soviets of Workers' and Soldiers' Deputies are. They do not want to see the obvious truth that, since these Soviets exist, since they are the government, there is a state like the Paris Commune in Russia». [3, p. 146]. From the point of view of facts, the Bolsheviks had nothing to do with the creation of the Petrograd Soviet, but this did not prevent them from using it as a tool to achieve their goal. The Petrograd Soviet of Workers' and Soldiers' Deputies was created by the Mensheviks, its first composition consisted mainly of representatives of the Menshevik Party. However, since April 1917, V.I. Lenin and

his associates did a difficult job of «Bolshevizing» the Petrograd Soviet, which led to the fact that in September of the same year L.D. Trotsky, one of the leaders of the Bolshevik Party, became Chairman of the council, and by November most of the seats were already occupied by representatives of the Bolshevik Party.

Later, Stalin also discussed the system of soviets, that had been implemented in the Soviet Union, mentioning also the Paris Commune: «The Republic of Soviets is thus the political form sought and finally found, within which the economic emancipation of the proletariat and the complete victory of socialism must be achieved. The Paris Commune was the germ of this form. Soviet power is its development and completion». [9, p. 36].

Thus, the leaders of the Bolshevik Party advocated the creation of a state that, first of all, supports and protects the workers' rights, thereby creating a representative agency in the form of councils, which was conceptually borrowed from the Paris Commune of 1871. The experience of the Paris communards served as a kind of basis for the creation of a system of Soviets in the future of the USSR, which was directly discussed by I.V. Stalin, based on the opinion of V.I. Lenin.

We managed to make sure that the leaders of the Bolshevik Party studied and conceptually used the experience of the Paris Communards during the October Revolution and after it. Nevertheless, the main issue of the Thermidorian coup is related to the historical parallels of the October Revolution of 1917 and the Great French Revolution of 1789. As we understood, there are no objective links between the events in France in 1789–1792 and Russia. Yes, the Bolsheviks recognized the importance of this bourgeois revolution, and noted the special progressiveness of the Jacobins in the context of the French Revolution [6, p. 374], even directly comparing his party with them [4, p. 308], but it was the ideological opponents of the Russian Social Democratic Workers' Party (Bolsheviks) that initiated a long-term discussion, which was formally allowed by V.I. Lenin himself, drawing dangerous parallels between revolutionary events.

Before discussing the Thermidorian coup in the context of the October Revolution, it is necessary to understand what thermidor meant for the French Revolution of 1789. At its core, the coup of 9 Thermidor II (July 27, 1794) marked the end of the active phase of the French Revolution, as well as the end of the Jacobin dictatorship led by M. Robespierre. The key feature was that some of the Jacobin revolutionaries (J. B. Carrie, B. Barera, J. Billaud-Varenne, F. Thienville, Colo d'Herbois) opposed its own leader and a group of his closest associates, displacing the sole authority of M. Robespierre. The Russian historian E.E. Piskunov gave his definition of the Thermidorian coup – «thermidor» in a figurative sense means the destruction of the revolution and its conquests by the revolutionaries themselves, and not their opponents» [18, p. 11]. In contrast to his opinion, L.D. Trotsky spoke out, who considered the Thermidorian coup to be the distribution of

benefits among representatives of the Jacobin party, since «A counter-revolution equivalent to this revolution would have to bring about the restoration of feudal property» [8]. One can agree with L.D. Trotsky's opinion, since the Thermidorians did not touch the main achievements of the revolution, but only abandoned part of its results. It is from the point of view of internal rebellion and the rejection of part of the revolutionary gains that we will consider the Thermidorian coup in the context of the October Revolution.

The first, who spoke out on the topic of a possible thermidor for the Russian revolution was J.O. Martov, the leader of the Menshevik Party, who in March 1918 wrote an article «On the Eve of the Russian Thermidor». It is worth mentioning right away that I could not find the original source of the article, and all references to it lead to the study of the Russian historian T.S. Kondratieva, who studied the phenomenon of the Thermidorian coup in the context of the Russian revolution in detail, having outlined her conclusions in the work «The Bolshevik Jacobins and the ghost of Thermidor» [13], therefore, the article by J.O. Martov I used is in the retelling of the above-mentioned historian. The main idea of the article by the Menshevik leader, which is given in the retelling by T.S. Kondratieva, is the decline of revolutionary sentiments in March 1918 for two reasons: 1) the Bolsheviks' dispersal of the Constituent Assembly, 2) the signing a peace treaty between Soviet Russia and Germany. In the first case, the Menshevik leader noted the Bolsheviks' encroachments on democratic freedoms, which were established after February 1917, and in the second – the decline of the socialist efforts and the solution of local national tasks [13, pp. 63-64]. Nevertheless, the above events did not lead to an uprising of the inner-party elites of the Bolshevik Party, although it is worth mentioning that discussions within the party were conducted and not all members were satisfied with this result.

In addition to Y.O. Martov, the emigrant press also wrote about a possible Thermidorian coup. For example, in the newspaper «Latest News», where the editor-in-chief was P.N. Milyukov. The Russian emigrant society saw the possibility of thermidor in the Kronstadt mutiny of 1921. Russian emigrants saw an opportunity of overthrowing the Bolshevik government in the revolutionary sailors who opposed the internal policy pursued by the Bolsheviks. However, at that time V.I. Lenin was aware of the disastrous situation inside the country, so the Bolshevik leader announced a plan for a New Economic Policy literally on the same days, at the X Congress of the Communist Party.

The NEP allowed the Bolsheviks to overcome the internal economic crisis. The decree of July 7, 1921 allowed Soviet citizens to create small-scale industrial enterprises, which led to the fact that part of the economic sector was transferred to individuals, significantly reducing the state's role in this sector of the economy [1]. Based on our criteria for defining the Thermidorian coup (internal rebellion in

the ruling revolutionary party, as well as the destruction of part of the revolutionary gains), we can say that the NEP strike at the core of the socialist system and returned private property to the economic sector, which the Bolsheviks opposed until October 1917. Nevertheless, the first condition was not fulfilled, so we cannot say that a Thermidorian coup took place in Soviet Russia according to the French scenario.

The introduction of a New economic policy can be defined as «self-Thermidorization», which has two definitions – 1) the decisions of the leaders of socialist countries aimed at desocialization and returning to capitalism; 2) the restoration of market relations in socialist countries for the convenience of socialism [20]. It is the second definition that fits the current situation in Soviet Russia in 1921. The introduction of the NEP was a necessary step that allowed the Bolshevik party to retain the main gains of their revolution and cut losses».

Thus, the Bolsheviks used the experience of the Paris Communards in creating a system of soviets, and also drew direct and indirect historical parallels with the French revolutionaries of the late 18th century, which led to a discussion around a possible Thermidorian coup in the context of the October Revolution, which was mostly started by opponents of the Bolshevik government. However, the main conclusion we have come to is the absence of the Thermidorian coup that took place in France in 1792. The process of «self-Thermidorization», which was aimed at preserving the socialist system, rather than destroying it, is more suitable for Russian history.

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Perboundos 的拜占庭和后拜占庭图像

BYZANTINE AND POST-BYZANTINE IMAGES OF PERBOUNDOS

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抽象的。历史来源是一个概括性的概念,它既包括原始版本——最早的版本,也包括所有后续版本。与此同时,最早的版本通常被认为是最有价值的,但情况并非总是如此。《帖撒罗尼迦圣德米特里的奇迹》中佩尔邦多斯的故事已经被翻译了好几次,尽管它只作为一个版本的奇迹综合集的组成部分而流传下来。从故事情节的角度来看,翻译和后来的版本的价值并不亚于“原版”。这篇文章比较了巴黎《奇迹》原稿和马卡里乌斯《伟大的梅奈翁读本》的版本中对佩邦多斯的解释。

关键词: 塞萨洛尼卡圣德米特里的奇迹、Perboundos、676-78 年塞萨洛尼卡围攻、马卡里乌斯的伟大梅奈翁读本。

Abstract. *The historical source is a generalizing concept, it includes both the original - the earliest edition, and all subsequent ones. At the same time, the earliest editions are often perceived as the most valuable, which is not always the case. The story of Perboundos in the Miracles of St. Demetrius of Thessalonica has been translated several times, although it has come down to us as an integral part of a comprehensive collection of Miracles in only one edition. The translation and later editions are no less valuable in the context of the plot of the story than the «original». The article compares the interpretations used in relation to Perboundos in the «original» Parisian manuscript of «Miracles» and the edition as part of the Great Menaion Reader of Macarius.*

Keywords: *Miracles of St. Demetrius of Thessalonica, Perboundos, The Siege of Thessalonica in 676-78, Great Menaion Reader of Macarius.*

The early history of the Slavs has a rich historiography, many of its issues have already been awarded their own monographs. However, there are a number of subjects that have been touched upon by researchers, either in passing or insufficiently. Often, these deprived plots quite rightly do not find their researcher, due to their low reliability and illumination by sources, but it also happens that the perspective of the topic overlaps the above disadvantages.

In the early history of the Slavs, one of the most important issues is the level of their progress at various points. In this case, various problems are considered: the social structure, culture, the level of technological progress, geopolitics and, in general, the political structure. One of the aspects of society's life that can illustrate the largest range of issues is power and stories related to a specific person in power. It is precisely such narratives that are of particular interest to researchers. The title, the attitude towards the people, the connection with a specific state or proto-state, as in this case, interaction with neighbors – all these are private issues of these plots, subject to separate consideration. A striking example of such plots is the story of Perboundos.

Первуд in Russian-language historiography (περβούνδος in the original source) or Perboundos/Perbundos/Prebondos in English-language historiography is the leader of the Slavic tribe of the Richnins, the culprit of a small uprising in the lands of the North of the Balkan Peninsula inhabited by Slavs against Byzantium, the direct culprit of the siege of Thessalonica in 676-78 [9].

The story of Perboundos has come down to us in only one source – the Miracles of St. Demetrius of Thessalonica, exactly in its second collection, created by an unknown author and published only in the Paris manuscript of the «Miracles» of the XII century. The manuscript was probably compiled in Thessalonica in the XII century, respectively. It distinguished itself with the most complete collection of texts about St. Demetrius, including miracles. Apparently, this manuscript was an attempt to create a «Corpus Demetrianum» [3, pp. 34-35]. It, in turn, was published in several publications, including by Albert Tugar [5], who supplemented the already published plots of «Miracles» with the messages of the manuscript. The most complete critical edition is the edition authored by Paul Lemerle in 1979 [3], which became the basis for the Russian-language translation of the «Slavic» chapters of «Miracles» [9]. The story of Perboundos was translated, in turn, according to the old edition of the Greek text.

The uniqueness of the messages of the second meeting defines a number of both problems and unique opportunities. On the one hand, the fact that we know about Perboundos only from «Miracles» and, moreover, only from one chapter of one collection, which has come down in one manuscript, forces us to think about the reliability of the plots cited. Indeed, the text, unique in its essence, requires particularly careful criticism, in general, he has already managed to receive it. The edition of Lemerle analyzes this issue detail. Lemerle concludes that the text of «Miracles» can be trusted, not without a certain amount of skepticism, of course, but the text provides fairly realistic information. The other side of this problem opens up interesting prospects for study. The uniqueness of the reports on Perboundos allows us to resort to a comparative analysis of various publications not just from different periods, but from different cultures and written traditions and,

moreover, in different languages. Given the presence of one primary source, the comparison turns out to be the most appropriate and fair method of studying the perception of Perboundos in various cultural and historical circumstances. Moreover, it is fair to note the value of this plot regardless. It is important to us not only as a collection of «facts» about Slavic history, but also, at least, an excellent indicator of the ethnopolitical worldview orientation of the author of the text/publication. In this regard, the reality of the given plots does not matter much, which, as noted above, in general, does not cause much controversy. It is important how the sources bearing the relevant news respond to Perboundos.

In general, there have been no attempts to analyze the specifics of the perception of the authors of various publications of the story about Perboundos directly. However, the Perboundos as a problem has a relatively rich historiography. There are no special works (whether articles or full-fledged monographs) on the Perboundos in Slavic historiography. The vast majority of authors mentioning it in their research are limited either to analyzing the title and its correspondence to a certain position in Slavic society, or to narrative narration (retelling the text of the chapter of «Miracles»). Any attempts to trace the continuity or opposition between the various editions of «Miracles» were rarely made, this issue is most fully disclosed in the work of Tepkova-Zaimova «LES TEXTES DEMETRIENS DANS LES RECUEILS DE RILA ET DANS LA COLLECTION DE MACAIRE» [4], however, the plot directly related to Perboundos is not affected. Here, the Bulgarian researcher's investigation is important for us with regard to the later editions of «Miracles», which already contain a story about Perboundos.

We are talking about the Old Bulgarian translation, which formed the basis of the edition of the XV-XVI centuries published in the Great Chetye-Minei by Archbishop Makarii of Novgorod [6]. This redaction is best suited for comparison with the original, cited in critical editions from the Paris manuscript of the XII century. The same researcher also wrote a comprehensive analysis of the text of «Miracles» in the context of Slavic history – «Текстове за св. Димитър Солунски в Макариевия сборник», where a separate plot describes the story of Perboundos [7, p. 149]. A comparison of the terminology and titles of both publications under consideration is also provided here.

In Soviet and Russian historiography, the most complete review and analysis of the news about Perboundos was given by G.G. Litavrin [8, pp. 78-84]. The researcher examines the attitude of the author of «Miracles» to Perboundos and focuses on the title used in relation to him, a narrative of «Miracles» about the role of Perboundos in the events described in the chapter is given separately. «Perboundos, the leader of the Rinkhins, who was executed because of suspicions of a conspiracy to seize Thessalonica, spoke Greek, often visited the city (he was arrested during his stay there), had friends among the nobility of the city (L., I,

p. 209. 7-18, § 231, 232; p. 209. 29-31, § 235)» - this is how the author describes Perboundos [8, p. 78]. In this brief description, which opens the narrative, the emphasis is on the facts testifying to the great cultural influence of Byzantium on Perboundos: command of the Greek language, frequent visits to the city (Thessalonica), social ties within imperial society. The name «leader/вождь» is especially significant here, in the context of those characteristics that English-language historiography gives Perboundos – «King» is used very often as a characteristic of Perboundos's attitude to the Rikhnin tribe. In the works of Florin Curta – «The unknown author of Book II describes the powerful polity of the Slavic Rynchines led by «king» Perbundos» [1, p. 97], Mitko Panov – «The names of the Slavene tribes appeared again only in the 670s when the anonymous author was writing as an eyewitness, describing the Thessalonica siege that occurred as a result of the liquidation of the king of the Rhynchines, Preboundos». Adam Izdebski provides a somewhat more detailed analysis of the vocabulary used in relation to Perboundos [2, pp. 61-64]. The etymology of the name itself is worth mentioning, which we will return to a little later.

Before comparing the traditions of interpreting the story of Perboundos in the Paris manuscript and the Old Bulgarian translation that has come down to the Great Chetye-Minei, it would be wise to highlight all the facts contained in the source of both editions about Perboundos and compare them in order.

«Περβουδος» – «ρηξ» of the Rhynchines, a tribe of Slavs who got their name from a river that flowed near Thessalonica. It is also noted that he «with cunning intent and with insidious intent plots against our city» [9, 231].

The title of the story about Perboundos calls him a king in plain text – «Чюдо о граде Солунъстеѣмъ и о Пребудѣ князѣ и неослабнѣмъ его воеваніи» [6, 1928]. The text also mentions the name in a narrative similar to the original about the belonging of the Perboundos to the Rikhnin tribe, while the name of the «князь» is not called [6, 1929]. In the same passage, the expression «хощет воевати градъ нашъ» is given as a characteristic of the motives of Perboundos. The author, neither in the original nor in the translation, tries to understand the motives of Perboundos, his «evil» intentions are an axiom. This plot is necessary only to motivate further events. Such abstraction from a part of history can speak quite a lot, however, in the context of our study, what matters here is the fact that the author of the translation concretizes and simplifies this passage. Even less understanding of the background leads the story immediately into dynamics. Moreover, the malice of the original is identified with «воевати». A similar approach is observed in the author's use of the translation of the title «князь» as something identical to «ρηξ», which in general does not find much criticism in historiography.

In general, the arguments given by Litavrin on this issue are quite fair [8, p. 79]. The etymology of Perboundos's name suggests a similar conclusion. How-

ever, there will be no serious argument from this fact, this is due to the initial translational perception of the name «king». Slavic translations often featured «Прѣбждь», «Первждь», «Пребоудь», «Пребждь», which, apparently, were translations of the original Greek «Περβουνδος», and not by interpreting a familiar name in a similar manner, which, it is important to note, is also possible. In general, the general narrative of the source contextually confirms the position of Perboundos among the Slavs as one of the leaders of the first [9, p. 199].

So, if there are no discrepancies in the texts in fundamental issues – the title and attitude to the Rhynchines – then they are quite clearly present in the motives and attitude of the “king” to the “City”. Moreover, even the editor of the 1880 edition of the Great Chetye-Minei, in a page-by-page note to the text of the story, makes a comparison with the Greek original, where the meaning really differs from that proposed by the Old Russian edition. The meaning invested here greatly narrows the potential motives of Perboundos in relation to the Thessalonians – limits them only to war, when, as the original, it leaves much more room for reflection with its «insidious malefactors».

The capture of Perboundos in the city is an unexpected event and causes some resonance, which, as we see from the text, is obvious to the author [9, 231]. The nobility who had the opportunity to capture Perboundos is mentioned, and the fact that the latter was in the city at the time of the narration is noted.

The Chetyi-Minei bring the «nobility» into line with the word «боляры». The plot of Perboundos’s capture changes: the secrecy of reading the imperial letter to the nobility, as part of the plot, disappears in the Old Russian edition, and a short message about Perboundos’s presence at the time of capture in the city is expanded by praising the role of divine intent in this fact.

«И писанію цареву прочтену быв’шу предъ всѣми боляры, и тако епархъ всѣмъ заповѣда прилѣжно гати его, идѣте аще обрящется. По смотренію же божію не надлѣзѣь самъ о себѣ приде въ градъ нашъ, и тако епархомъ гать бысть и, оковавшие его таж’кими веригами, послаша его къ святому самодѣержцу» [6, 1929].

Bolyary is a term that apparently migrated from the Old Bulgarian written tradition straight into the collection of Macarius, accordingly, it does not seem advisable to look for special subtexts here. And the omission of the plot about the secret message for the nobility, in turn, deserves special attention, later in the text we will return to the analysis of this trend.

Much attention should be paid to the plot of the negotiations between representatives of the Slavs, who took care of the issue of the return of the “king” home. Apart from the very fact of the negotiations, the story of Perboundos’s escape turns out to be especially significant. The following points are interesting here: Slavic envoys and the fact of successful negotiations, providing Perboundos with

everyday (Greek) clothes and his free movement around the city, the intervention of the devil in escape, terminology used in relation to the place where Perboundos would have to return – «his native country» [9, 232-234] – «на село свое, сущее въ Фрачестѣй странѣ и отгуду проводити его въ его отечество» (according to the Great Chetyi-Miney) [6, 1930]. There are no discrepancies in these plots.

Further in the text of the translation, a note is mentioned about the level of proficiency in the Primary Greek language and his knowledge of the culture of behavior and speech of the Greeks – «яко единъ от гражданъ» [6, 1930]. This interpretation is possible due to the separation of commas on both sides of this note. This somewhat distorts the original text, where a similar remark referred to exactly how Pervoud managed to get out of the city walls. He came out as one of the townspeople. Contextually, the message acquires a very interesting interpretation.

The plot of the search for the escaped Perboundos contains discrepancies in the original and translation. In the Macarius collection, the text is not only shortened, but also expanded with new interpretations [6, 1931]. However, they relate to our issue only indirectly. However, the fact of such a presentation of the material (along with repeatedly found similar examples) suggests a different edition of the original source that fell into the hands of the translator, or a free, albeit close to the text, retelling of the story about Perboundos. Similar conclusions have already been given by Тепкова-Zaimova [7, p. 149].

The following differences in the texts are observed in the part containing the information of Perboundos's death. If the original tells us about a thorough investigation [9, 240], which indicated the impossibility of reaching an honest agreement with Perboundos and the potential consequences of his release, then the editors of the the Great Chetyi-Miney report how «Пребѣждь» «неволею исповѣдует» similar dangers. In response to this threat, Pervoud was apparently executed. In general, an important specific feature of the source (largely explained by its genre affiliation) is the blurring of facts in the narrative. At the same time, these expansive formulations can be associated both with the author's ignorance of the details, and with a conscious omission of details due to the concept of the work.

Initially, it was expected to find a different perception of Perboundos in the text of the Macarius edition. This could be due to his Slavic origin. However, as a result of the analysis, we find discrepancies caused not by the ethnic component, but by the origin of the translation and the conceptual continuity between the editions.

The plot of the story about Perboundos smoothly merges into the general idea of «Miracles». The author of the original, as well as subsequent translators, were guided primarily by genre motives. The goal – to indicate the role of the connection between Thessalonica and St. Demetrius through a series of bad weather occurring with the city – is successfully achieved in the work. Often, fundamental issues are overlooked in favor of this idea.

The following aspects of the Slavic translation of «Miracles» and “the story” in its composition are of the greatest value: the reduction of equivalents to the title and the name of Perboundos in a language somewhat chronologically distant to the bearer of which Perboundos himself was, the obvious importance and fame of the plot in question at the time of translation and publication, small but fundamental differences in understanding some points of the story. A number of terms used in translation can be discussed separately, such as боляры», «словеньскаго языка», «село», «отечество»... However, contextually, this terminology does not seem to have any great differences from the original.

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DOI 10.34660/INF.2024.26.74.014

美国中东地区霸权分析
ANALYSIS OF US HEGEMONY IN THE MIDDLE EAST REGION

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摘要. 这篇科学文章致力于分析美国在中东的霸权。冷战结束后,美国有意加强在中东的战略地位和影响力,逐步扩大在该地区的势力范围,成为最具主导地位的国家。在美国强化霸权地位和战略影响力的过程中,中东民主转型是其战略重点。美国政府中东民主变革的最直接原因是2001年9月11日疫情爆发后,布什政策的全球战略重点从防范和遏制大国转向反恐。

关键词: 霸权、政治制度、民主转型、霸权地位、公共、战略重点。

Abstract. *The scientific article is devoted to the analysis of US hegemony in the Middle East. After the end of the Cold War, the United States intended to strengthen its strategic position and influence in the Middle East, gradually expanding its sphere of influence in the region and becoming the most dominant power. In the process of strengthening the hegemonic status and strategic influence of the United States, democratic transition in the Middle East is its strategic focus. The immediate reason for the US government's democratic changes in the Middle East was that after the outbreak of September 11, 2001, the global strategic focus of the Bush administration's policy shifted from preventing and containing major powers to countering terrorism.*

Keywords: *hegemony, political system, democratic transformations, hegemonic status, public, strategic focus.*

At the beginning of the 21st century, the United States proposed the “Greater Middle East” plan, the goal of which is to export Western democratic ideas to the Middle East and the entire Islamic world and form the so-called “Greater Middle East” with a completely Westernized political and economic system. There are historical and practical reasons for US democratic reforms in the Middle East.

The main path of early US democratic change in the Middle East was based on American evangelicals as a core group, by establishing church schools in the Islamic world of the Middle East (mainly ISIS, Gulf and North African Muslims) to influence the public through religion. For practical reasons, during the Cold War the fight against the former Soviet Union and the competition for the Middle East were an important part of US global strategy.

It is important to emphasize that the Middle East is the region where the United States has invested the most strategic resources since the war. Half a century of intensive and large-scale investment has allowed the United States to maintain its dominant position in the Middle East. At the beginning of the 21st century, the center of gravity of the world economy and politics moved to the Asia-Pacific region, which, coupled with two wars and financial crises, forced the United States to adjust its global strategy: first, a strategic shift to the east; secondly, limit and reduce investments in the Asia-Pacific region [3].

According to the George W. Bush administration, there will be no use of force, let alone terrorism, in relations between democratic countries. In turn, autocratic regimes in the Muslim world are a favorable environment for terrorism, and only democratic transformations in the Middle East can eliminate the root causes of this illegal phenomenon. From a historical perspective, in October 2001, the United States and its allies announced a strike against the Afghan Taliban regime and al-Qaeda. In March 2003, the United States unilaterally declared the use of force, began military intervention in Iraq because the country possessed lethal weapons, and supported terrorists. As a result of the war, almost 200,000 Iraqi civilians died as part of military operations and violent conflicts, and tens of millions of people were forced to leave their homeland and become refugees [4].

After the war, Iraqi society was in a state of anarchy for a long time, the state could not function normally, and border security was difficult to ensure. In June 2004, George W. Bush proposed a “Greater Middle East” democracy plan at the G8 summit that year and publicly proposed comprehensive political, economic, social and cultural reforms in the Arab and Islamic countries of the Middle East, including 22 member states of the League of Arab States. The Arab League and five other states—Israel, Pakistan, Afghanistan, Iran, and Turkey—should promote the democratic transformation of Arab regimes and the introduction of free-market capitalist economies. On August 30, 2021, the US military hastily withdrew from Kabul, the capital of Afghanistan, officially announcing the end of the 20-year war in that country [5].

In addition, another example of US democratic transformation in the Middle East is the Arab Spring. In December 2010, a wave of social change that originated in Tunisia spread throughout the Arab world. In January 2011, the regime of Zine el-Abidine Ben Ali in Tunisia was overthrown, and in February of the same

year, the regime of Hosni Mubarak in Egypt. The United States carried out a democratic transformation of the Western model in the Middle East and imposed its own so-called democratic and free political system and development model on the countries. It should be noted that this is an important external factor that ultimately led to the start of the Arab Spring. The United States shapes and directs the Middle East region in three ways: by focusing on public opinion, planning a “color revolution” in the process of upheaval, and selectively intervening in Middle Eastern countries so that they can develop in a direction beneficial to the United States [6].

In particular, when there were riots in pro-American countries such as Egypt and Tunisia, the United States did not intervene. While the situation has been difficult to control, pressure has been exerted through economic aid, while in anti-American countries such as Libya and Syria; on the contrary, efforts can be seen to encourage regime change. US democracy is a shared value for all humanity, but there is no model of political system that applies to all countries in the world. However, over a long period of time, in order to maintain its own hegemony, the US has privatized the concept of “democracy”, fomented division and created confrontation under the banner of democracy and undermined the international system with the UN at its core and the international order based on international law. Although the immediate cause of the conflict is the aggravation of contradictions between the internal political groups of the two countries, analysts note that the root cause lies in the behavior of the United States, waging war and interfering in the internal affairs of Middle Eastern countries [2].

The Middle East is an important producer of the world’s oil resources and has long been a key region for the United States in maintaining global hegemony. In order to overthrow the governments of Middle Eastern countries that did not obey his orders, the United States sought various pretexts, unscrupulous means, and even started wars. According to statistics, from 2003 to 2021, when the United States launched the war in Iraq, about 209,000 Iraqi civilians died in wars and violent conflicts, and about 9.2 million Iraqis became refugees [5]. Following the outbreak of the Syrian Civil War in 2011, the United States and its Western allies vigorously supported Syrian opposition forces and attempted to overthrow the Syrian government by supporting proxies, leading to local wars and conflicts that continue to this day. In the process of its development, the United States continues to maintain a military presence in Syria, not only providing support to opposition forces, carrying out indiscriminate airstrikes in Syria, but also acquiring Syrian oil, food and other resources. The United States is causing serious damage to the sovereignty, independence and integrity of the Middle Eastern countries, seriously impinging on the Middle Eastern countries’ right to peace and development, and seriously threatening the right to life and survival of peoples. Behind this is the embodiment of American hegemonic thinking and power politics, which have

caused irreparable harm to the countries and peoples of the Middle East, as well as harm to the people of the whole world.

In modern conditions, the United States has provoked wars, coups d'état, interfered in internal affairs and committed other atrocities that have undermined the efforts of Middle Eastern countries to independently find a path to development, leading to the collapse of the political and social order of these countries, the destruction of national unity and cohesion and the loss of fundamental rights. In Syria, the ongoing war caused by US military intervention and long-term economic sanctions has left the Syrian economy in a state of stagnation. Today, the vast majority of Syrians live below the poverty line and basic livelihood services such as water, electricity and health care cannot be guaranteed [4].

The United States' withdrawal from Iraq and the war in Syria have led to the unprincipled expansion of ISIS's power. The compromise reached with Iran on the nuclear issue led to discontent between Israel and Saudi Arabia, which significantly weakened US-Saudi relations and US-Israeli relations. The current battle between the United States and Russia in the Middle East is very different from the struggle between the United States and the Soviet Union for sphere of influence during the Cold War. It should be noted that the Middle East has been a place of hegemony since ancient times. The complex ethnic, religious and geographical contradictions in the Middle East determine that the balance of power in the region will always be in a dynamic equilibrium [1].

Thus, from the point of view of comparative analysis, when the United States went to war, the concept of "democracy and freedom" was in force, which ultimately turned out to be just a pretext for expanding its hegemony purely for geopolitical reasons. Democracy, as promoted by the US, has been found to be about winning over other countries to fight adversaries through military intervention, economic sanctions and the export of ideology. The true goal is to establish hegemony and create division on a global scale by attracting factions. In terms of specific activities, the United States is pursuing an overt hegemonic policy, implementing military containment procedures against anti-American countries in the region, while at the same time actively promoting the political systems and ideologies of the West, ignoring the interests of countries and peoples in the Middle East.

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各类腺病毒抗体血清特异性的研究
**THE STUDY OF THE SEROSPECIFICITY OF ANTIBODIES TO
ADENOVIRUSES OF VARIOUS TYPES**

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抽象的。众所周知，腺病毒的特异性抗体是与病毒的三种主要衣壳蛋白——六邻体、五邻体和五邻体延伸或纤维形成的。在这项研究中，我们分析了小鼠模型中腺特异性 IgG (包括病毒中和抗体) 的交叉活性。获得的结果表明，病毒中和抗体 (VNA) 具有血清特异性，并且主要在六邻体上形成。我们还发现，对于 D 亚组病毒，大约十分之一的 VNA 是在纤维上产生的。这些数据对于制定利用腺病毒载体克服免疫学限制和提高免疫效率的策略具有重要意义。

关键词：腺病毒，病毒中和抗体，腺特异性抗体，抗体交叉反应性。

Abstract. *It is known that specific antibodies to adenovirus are formed to the three main capsid proteins of the virus - hexon, penton and penton extension or fiber. In this study, we analyzed the cross-activity of adeno-specific IgG, including virus-neutralizing antibodies, in a mouse model. The results obtained showed that virus neutralizing antibodies (VNA) are serospecific and are formed mainly on hexon. We also found that for subgroup D viruses, approximately a tenth of the VNA is produced on fiber. These data have important implications for the development of strategies to overcome immunological limitations and improve immunization efficiency using adenoviral vectors.*

Keywords: *adenovirus, virus-neutralizing antibodies, adeno-specific antibodies, antibody cross-reactivity.*

Introduction. Adenoviruses (Ad) are non-enveloped DNA viruses that are now well studied and widely used as vectors for vaccination and gene therapy.

According to biological, chemical, immunological and morphological characteristics, all human adenoviruses are grouped into 7 subgroups, from A to G, with further division into serotypes, including genotypes. Currently, 57 human AD serotypes are recognized by the International Committee on Taxonomy of Viruses (1) and are immunologically distinct. Since all the recently identified new adenoviruses have been discovered and characterized using computer analysis of genomic data, it was decided to replace the term “serotype” with “type”.

The main proteins of the viral capsid are hexon, penton base and fiber. Hexon makes up about 60% of the virion mass and contains a conserved region with genus-specific determinants. Both hexon and fiber also contain epitopes specific for each type (2) and therefore humoral immunity to a particular type does not provide cross-immunity to other types of adenoviruses of different subgroups.

Previous studies have shown that penton- and fiber-specific antibodies have synergistic neutralizing reactivity that is functionally significant. And specific neutralizing antibodies to hexon are dominant (3). In addition, antibodies induced by natural infection are directed primarily to fiber and penton, and by immunization to hexon (4).

In this study, we demonstrated that adenospecific IgG antibodies are cross-reactive, unlike VNA, which are serotype-specific. We also showed that for subgroup D viruses, approximately a tenth of the VNA is formed on fiber.

Materials and methods. The induction of antibodies to various Ad serotypes, as well as their cross-activity, was assessed in mice of the inbred DBA/2 line. For this purpose, the mice were divided into 5 groups of 5 mice ($n=5$). Animals were immunized twice intramuscularly with human adenoviruses 1, 2, 5, 19, 26 and 37 serotypes and monkey adenovirus serotype 25 at the same dose (2×10^{10} viral particles) with an interval of 21 days. Blood serum of immunized animals was obtained on day 42 from the moment of primary immunization. IgG analysis was performed using an enzyme-linked immunosorbent assay, and VNA using a microneutralization reaction.

Results and discussion. The main structural proteins of the adenovirus capsid (hexon, penton and fiber) have a similar structure in all members of the family and contain a set of antigenic determinants of broad specificity. In this case, during the development of the immune response, the synthesis of antibodies to hexon predominates, because it is a major capsid protein. We first determined the total level of adeno-specific IgG using an enzyme-linked immunosorbent assay to ensure the presence of an immune response (Figure 1).

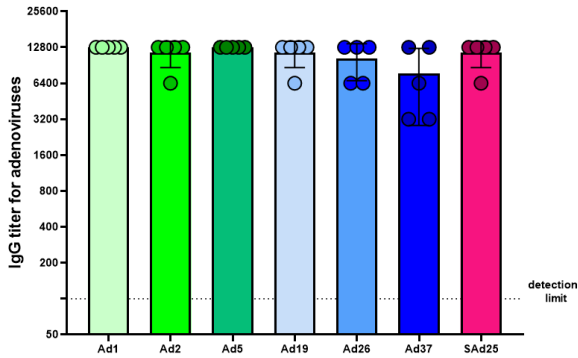


Figure 1. Titer of adenospecific IgG antibodies in the blood serum of immunized mice. The dots indicate values for each animal. Bars represent geometric mean with 95% CI.

According to the results of the analysis, we observed the presence of relatively similar levels of adenospecific IgG antibodies in the blood serum of animals immunized with different types of Ad (Table 1), which indicates the development of similar humoral immunological reactions in response to the introduction of adenoviruses.

Table 1
Geometric mean titers (GMT) of adenospecific IgG antibodies in the blood serum of immunized mice.

	Ad1	Ad2	Ad5	Ad19	Ad26	Ad37	Sad25
GMT	1:12800	1:11143	1:12800	1:11143	1:9701	1:6400	1:11143
95% CI	12800	7583-16374	12800	7583-16374	6054-15543	2706-15134	7583-16374

Next, an enzyme-linked immunosorbent assay was performed to determine the cross-activity of adenospecific IgG antibodies. The results of the analysis are presented in Figure 2.

In animals immunized with one of the adenovirus serotypes, specific IgG antibodies are highly cross-reactive to adenoviruses from the same subgroup. At the same time, reduced reactivity to adenoviruses of other subgroups is observed.

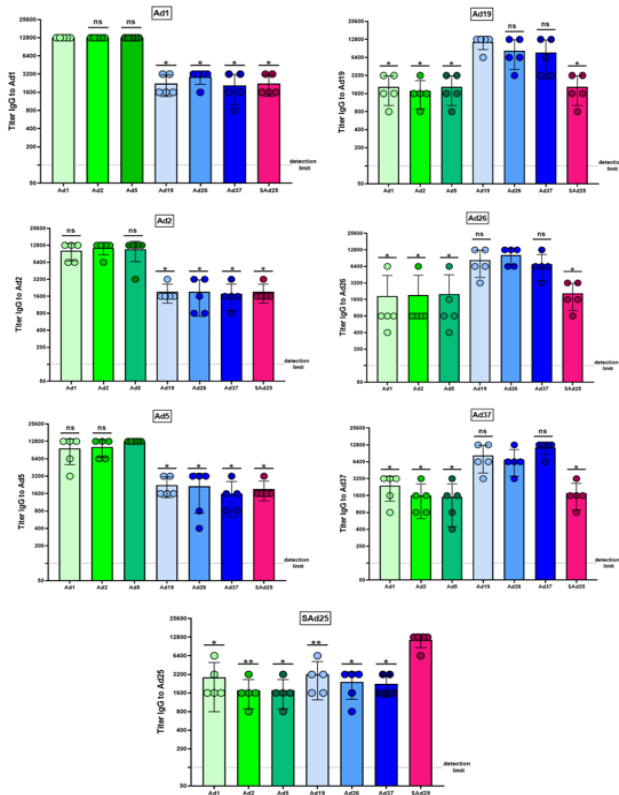


Figure 2. *Titers of adeno-specific IgG antibodies that are cross-reactive in the blood serum of immunized mice. The dots indicate values for each animal. Bars represent geometric mean with 95% CI. A statistically significant difference between antibodies to the determined serotype is indicated by the symbol * ($p = 0.0079$) and ** ($p = 0.0159$) according to the Mann-Whitney T-test, nd - indicates the absence of a statistically significant difference.*

Thus, after immunization with adenoviruses of subgroup C (Ad1, Ad2, Ad5), specific IgG antibodies with the same titer are formed in animals. Moreover, such antibodies are 6 times less reactive towards adenoviruses of subgroups D (Ad19, Ad26, Ad37) and E (SAd25). After immunization of animals with adenoviruses of subgroup D, specific IgG antibodies are also 6 times less reactive to adenoviruses of subgroups C and E. And antibodies specific to SAd25 are more than 7 times less reactive to adenoviruses of other subgroups.

Although type-specific IgG antibodies had less cross-reactivity against adenoviruses from other subgroups, they are generally not serospecific. This fact is explained by the fact that IgG antibodies are formed not only against the variable regions of capsid proteins (hexon, penton, fiber), but also against conservative determinants.

Unlike general IgG antibodies, virus-neutralizing antibodies are serospecific, as they are formed on the hypervariable regions of the immunodominant proteins of the adenovirus. In particular, on the hypervariable regions of the hexon protein.

At the next stage, virus-neutralizing antibodies and their cross-reactivity were determined in the same serum samples using a microneutralization reaction.

The overall level of virus-neutralizing adeno-specific antibodies is presented in Figure 3.

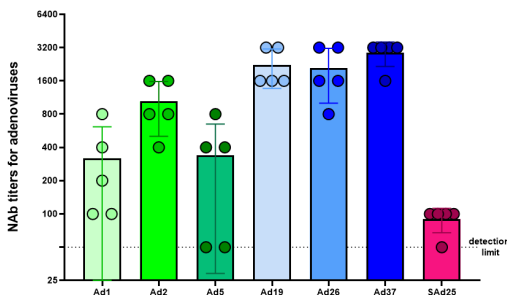


Figure 3. Titer of virus-neutralizing adeno-specific antibodies in the blood serum of immunized mice. The dots indicate values for each animal. Bars represent geometric mean with 95% CI.

According to the results of the analysis, the presence of VNA was observed in all sera of mice immunized with adenoviruses from subgroups C, D and E. Moreover, in contrast to general IgG antibodies, the level of VNA to adenovirus varied significantly depending on the type. The geometric mean value of the BNA titer for each group of animals is presented in Table 2.

Table 2

Geometric mean value of VNA titer in the blood serum of immunized mice.

	Ad1	Ad2	Ad5	Ad19	Ad26	Ad37	Sad25
GMT	1:230	1:919	1:200	1:2111	1:1838	1:2786	1:87
95% CI	74,8–705,6	447,3–1888	39,93–1001	1318–3383	894,5–3776	1896–4094	59,24–127,9

Next, VNA cross-reactivity analysis was performed. The results are presented in Figure 4.

Based on the results obtained, it is clear that VNA to adenoviruses serotypes 1, 2, 5, 26 and 25 do not have cross-reactivity, or the level of VNA in the sera of mice immunized with these serotypes was below the detection limit (1:50).

It is worth paying attention to the fact that cross-reactivity is observed between VNA to Ad19 and Ad37. In mice immunized with Ad19, VNA to Ad19 and Ad37 are detected. The difference in titers is approximately 10 times. Similar values were found for Ad37 in relation to Ad19. In this case, VNA cross-reactivity is observed due to the identity of one of the major proteins of the adenovirus, fiber, while the hexons and pentons of these two viruses are significantly different.

Thus, cross-reactive reactions of adeno-specific IgG antibodies, including virus-neutralizing ones, were studied. It has been demonstrated that IgG antibodies are not serotype-specific, unlike virus-neutralizing antibodies.

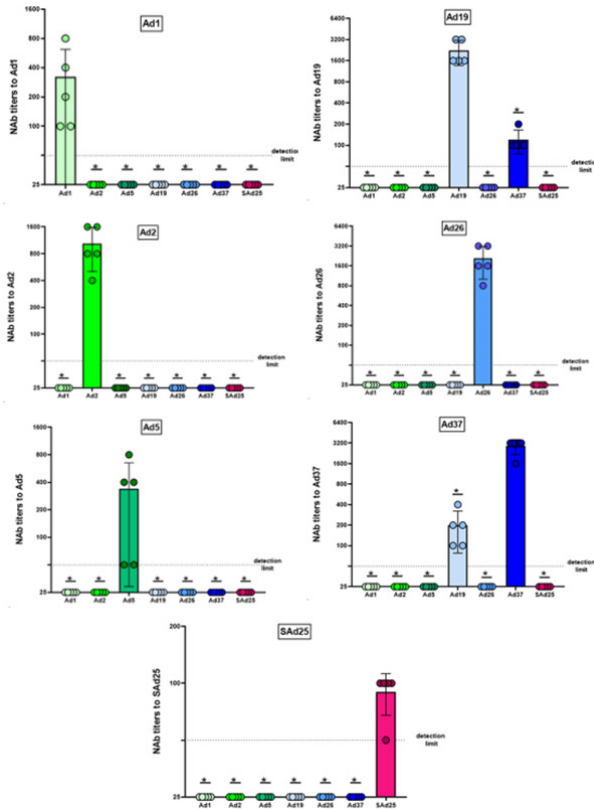


Figure 4. Titers of virus-neutralizing antibodies that are cross-reactive in the blood serum of immunized mice. Bars represent geometric mean with 95% CI. Statistically significant differences according to the Mann-Whitney T test are indicated by * ($p=0.0079$) and values. nd – indicates no statistically significant difference.

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DOI 10.34660/INF.2024.40.27.016

工业细胞培养中支原体检测的三种方法的比较
**COMPARISON OF THREE METHODS FOR MYCOPLASMA
DETECTION IN INDUSTRIAL CELL CULTURES**

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抽象的。支原体是细胞培养物中极其有问题的污染物。为了生产安全有效的生物技术产品，重要的是使用可靠且灵敏的控制方法来检测支原体污染。推荐的评估方法是直接接种法和细胞化学法，但也可以使用替代方法，特别是PCR法和支原体酶活性分析。通过比较可以选择更快、更准确和更具体的方法用于特定的细胞培养物。在本研究中，测试了三种检测 HEK293、Vero E6 和 CHO 细胞培养物中支原体的方法，并确定了最佳的一种。

关键词：支原体，细胞化学方法，支原体酶，PCR。

Abstract. *Mycoplasmas are extremely problematic contaminants of cell cultures. To produce safe and effective biotechnology products, it is important to use reliable and sensitive control methods that can detect mycoplasma contamination. The recommended methods of assessment are the direct inoculation method and the cytochemical method, however, alternative methods can also be used, in particular the PCR method and analysis of the activity of mycoplasma enzymes. Comparisons may allow the selection of a faster, more accurate, and more specific method for use on specific cell cultures. In this study, three methods for detecting mycoplasma in HEK293, Vero E6 and CHO cell cultures were tested and the most optimal one was determined.*

Keywords: *mycoplasma, cytochemical method, mycoplasma enzymes, PCR.*

Introduction. Mycoplasma can be detected when maintaining cell cultures used as producers of biotechnological drugs. Therefore, in production it is necessary to use initially non-contaminated materials (serums, media, cells), and when using, observe regular monitoring of the presence of foreign agents under strict conditions of aseptic rules. It has been shown that the level of contamination of cell cultures in collections around the world is 45-96% [1]. The most common mycoplasmas found in cell cultures are the following 7 species: *M. orale*, *M. hyorhinitis*, *M. arginini*, *M. fermentans*, *M. hominis*, *M. salivarium*, *A. laidlawii* [2]. In the Russian Federation, according to the requirements of the State Pharmacopoeia of the XIV edition, the direct seeding method (microbiological) and the indicator cell culture method (cytochemical) are recommended as methods for determining the presence of mycoplasmas in seed cells, master banks, working banks, control and production cultures [3]. The use of alternative control methods is also permitted: electron microscopy, immunofluorescent and enzyme immunoassays, molecular genetic studies (polymerase chain reaction (PCR), fluorescent in situ hybridization and others).

The sensitivity and specificity of the presented methods can vary greatly. It is necessary to constantly monitor for the presence of mycoplasma in cell cultures by one or more methods, the choice of which may be determined by different parameters, including the set of cell lines analyzed [4]. The cytochemical method, based on staining cell DNA with special fluorochromes (DAPI, Hoechst 33258, olivomycin) followed by detection in a fluorescence microscope, allows the detection of at least 105 units of mycoplasma per 1 ml of culture medium and gives fairly stable results [2, 5]. PCR, in turn, is a fast, accurate and highly specific method for detecting the most common types of mycoplasmas with the ability to detect 10 mycoplasmas in 10 µl of culture fluid [6]. At the same time, it is possible to use the MycoAlert kit for biochemical analysis, in which luminescence is measured by the reaction of luciferase with adenosine triphosphate, formed using mycoplasma-specific enzymes [7].

The purpose of the work is to compare and select the most optimal of three methods of analysis for the presence of mycoplasma contamination in three industrial cell cultures.

Materials and methods. Three cell lines were analyzed in the study: CHO - Chinese hamster ovary cells, HEK293 - human embryonic kidney cells, Vero E6 - African green monkey kidney epithelial cells. Cell cultures were grown in DMEM nutrient medium with 5% fetal blood serum (HyClone, USA). The cell suspension was incubated in a CO₂ incubator at a temperature of (37.0±1.0)°C in an atmosphere containing (5.0±0.5)% carbon dioxide for 3-5 days until a 70-75% monolayer was formed.

The cytochemical method for studying contamination with mycoplasmas consisted of incubating the test cell cultures with an indicator and subsequent treat-

ment with a specific fluorescent dye Hoechst-33258 (Sigma Aldrich, USA). A sterile glass slide was placed in a sterile Petri dish and 20–23 ml of a cell culture suspension in the DMEM nutrient medium was added at a concentration of no more than 105 cells per ml and fetal blood serum was added to a final concentration of 5%. 1 ml of test cells or test strain *M. arginini* G230 (100 CFU) was added and incubated for 3-5 days at $(5.0\pm 0.5)\%$ carbon dioxide for 3-5 days until a 70-75% monolayer was formed. The culture liquid was drained and the preparation was washed with phosphate buffer solution. The slide was kept in 96% ethyl alcohol for 30 minutes, dried and stained with a solution of Hoechst-33258 dye in a working concentration. Then the preparation was washed from the dye with sterile water and the results were assessed in a fluorescent microscope.

Biochemical analysis was carried out using the MycoAlert Mycoplasma Detection Kit (Lonza, USA), based on the study of the activity of mycoplasma enzymes in the culture medium of eukaryotic cells. At the first stage, 100 μ l of the supernatant is lysed, obtained by sedimenting 1 ml of cell suspension for 5 minutes at 200*g, by mixing with 100 μ l of the reagent and incubating for 5 minutes. The first luminescence measurement is then taken and 100 μ l of substrate containing luciferin, luciferase, adenosine diphosphate, adenosine monophosphate and inorganic phosphate is added. 10 minutes after this, a second luminescence measurement is made and the ratio of these measurements is calculated: the second to the first. The value of the resulting ratio indicates the presence or absence of mycoplasma in the sample.

The molecular genetic method based on PCR was the amplification of 10 ng of DNA isolated from the studied cell cultures into a specific fragment of the mycoplasma genome, which makes it possible to identify even a small number of microorganisms. The reaction mixture used primers GPO1 and MGSO, which are complementary to the conserved 16S rRNA gene of mycoplasma; the PCR program was the same as described in the literature [6]. Purified water treated with diethyl pyrocarbonate was used as a negative control; For positive control, 1000 copies of plasmid DNA containing the target PCR fragment of 704 nucleotide base pairs were used.

Results and discussion. The study consisted of a comparative analysis of three methods for determining the presence of mycoplasmas in cell cultures: cytochemical, biochemical and PCR.

The results of the analysis for the presence of mycoplasmas using the cytochemical method were carried out by microscoping stained preparations in a fluorescent microscope (Figure 1).

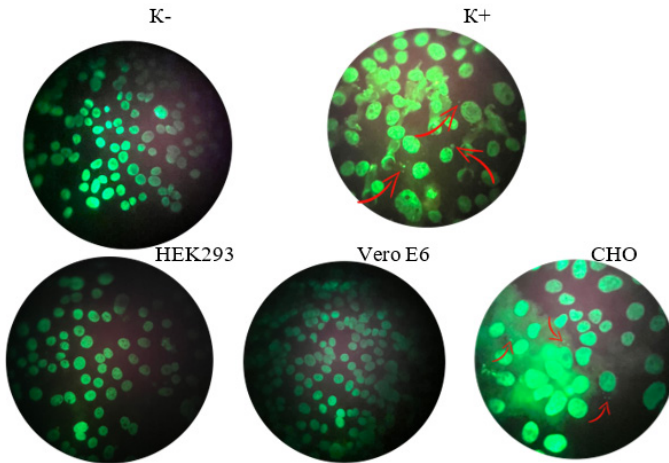


Figure 1. Cytochemical method for determining the presence of mycoplasmas.

Figure 1 shows that in the negative control sample, where an indicator cell culture was present, and in the studied cell lines HEK293 and Vero E6, no characteristic signs of the presence of mycoplasmas were detected along the cell boundaries and in the intercellular space. In the positive control sample with the added test strain *M. arginine* G230 and the CHO sample, the presence of mycoplasma was detected, since a characteristic glow was observed in them: uniformly colored spherical bodies with a diameter of 0.1-0.3 μm , individual or in the form of paired, chain, thread-like formations with a bright greenish glow along the boundaries of the nuclei of eukaryotic cells and in the intercellular space (indicated by arrows). The results allow us to conclude that the cytochemical method makes it possible to detect contamination with mycoplasmas, and in samples of pure cells and indicator cell culture, the DNA fluorescence characteristic of mycoplasma is not detected. This method requires additional professional training, thereby increasing the likelihood of unreliable results and does not accurately identify the organism that contaminated the sample.

When conducting a biochemical analysis using the MycoAlert kit, which analyzes the enzymatic activity of mycoplasmas, the results of the analysis were interpreted according to threshold criteria* (Table 1).

Table 1.
Results of biochemical analysis.

Sample	Sampling 1	Sampling 2	$\frac{\text{Sampling 2}}{\text{Sampling 1}}$	Presence of mycoplasma
HEK293	333	34	0,26	Absent
Vero E6	297	78	0,10	Absent
CHO	231	13352	57,8	Present

* Threshold criteria for the calculated values of the ratio of the second luminescence measurement to the first: less than 0.9 - no mycoplasma; 0.9-1.2 - repeated control; more than 1.2 - contamination with mycoplasma;

The obtained ratios of the second luminescence measurement to the first for the HEK293 and Vero E6 cell lines were less than 0.9, which indicates the absence of mycoplasma enzyme activity in these samples. In a sample of CHO cells, the ratio is greater than 1.2, indicating the presence of mycoplasma. Based on this, the method makes it possible to determine mycoplasma enzymes in contaminated samples, but in cell cultures free of mycoplasmas, an increase in the luminescence signal is not observed. Thus, the method is specific for mycoplasmas, but does not guarantee high sensitivity, and also requires a positive control to increase the reliability of the analysis.

The following are the PCR results (Fig. 2).

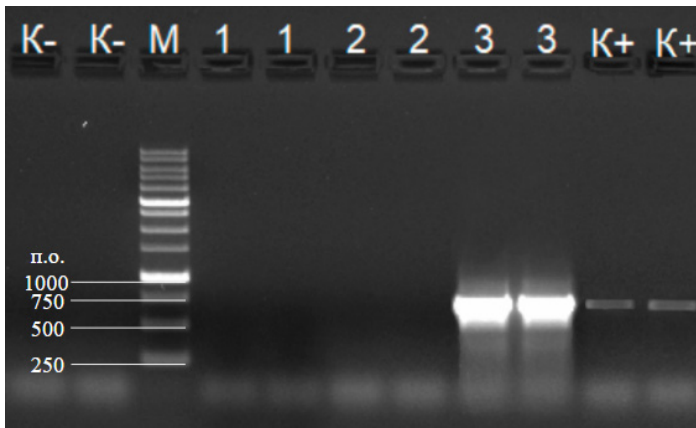


Figure 2. Results of PCR analysis with detection in agarose gel: K- – negative reaction control (water); M – molecular weight marker 1 kb DNA Ladder (Evrogen, Russian Federation); 1 - HEK293; 2 - Vero E6; 3 - CHO; K+ is a positive PCR control containing a specific fragment of the mycoplasma genome (103 genome copies per reaction).

In the negative control and pure cell cultures, no specific region of mycoplasma DNA was detected, while in the positive control and CHO samples, a PCR fragment approximately equal in size to 704 nucleotide base pairs was detected, which indicates the presence of mycoplasma in the test sample. The method allows you to quickly, with broad specificity and high sensitivity detect mycoplasma DNA. The presence of plasmid DNA containing a fragment of the mycoplasma genome makes the analysis more reliable and may allow quantification.

The absence or presence of mycoplasmas in the three tested cell cultures was confirmed by three different methods. After comparison, the molecular genetic method based on PCR was chosen as the most preferable and can be used in routine testing of cell cultures for the presence of mycoplasma.

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DOI 10.34660/INF.2024.76.14.017

发酵饮料质量的简单快速分析
**SIMPLE EXPRESS ANALYSIS OF FERMENTED BEVERAGES
QUALITY**

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抽象的。基于使用考马斯染料测定总蛋白和比较样品吸收光谱，展示了一种简单快速的发酵饮料质量测试方法。该方法适用于分析红葡萄酒、白葡萄酒、啤酒、苹果酒和格瓦斯。除了对样品进行准确的仪器表征外，该方法还可以适用于现场或家庭的定性测试。

关键词：葡萄酒、啤酒、克瓦斯、苹果酒、考马斯 G-250、总蛋白。

Abstract. *A simple and rapid method for testing the quality of fermented beverages is demonstrated, based on the determination of total protein using Coomassie dye and comparison of the absorption spectra of the samples. The applicability of the approach for the analysis of red and white wine, beer, cider and kvass is shown. In addition to accurate instrumental characterization of samples, this approach can be adapted for qualitative testing in the field or at home.*

Keywords: *wine, beer, kvass, cider, Coomassie G-250, total protein.*

Introduction

There are many popular drinks that are fermentation products. If the production technology or storage conditions are violated, these products may be contaminated with foreign substances of biological origin, for example, waste products of fungi and bacteria. Determination of individual specific markers, such as mycotoxins, is possible, but requires relatively complex analytical methods and, as a result, is not available for wide use. There is no doubt about the relevance of developing quality control methods that can be carried out quickly, without significant costs and without complex laboratory equipment.

Since all fermented beverages are based on natural biological raw materials and a similar biological manufacturing process, there is no doubt that total protein can be a universal marker that should be found in greater or lesser quantities in all these products. According to our assumption, a significant difference in this parameter for products of the same type may indicate either deviations in manufacturing technology or violations of storage conditions with possible contamination of products with foreign biomaterial of bacterial or fungal origin. Also, by the absence of total protein, it is possible to quickly identify counterfeit products obtained without the use of natural raw materials.

As a convenient and highly sensitive method for determining total protein, we chose the Bradford method, based on the formation of a protein complex with the Coomassie G-250 dye [1], which allows the determination of 1-2 μg of total protein in 1 mL of solution. We consider popular methods for protein determination using a biuret complex with copper ions to be limitedly suitable for our purpose, since the samples we study may contain significant amounts of reducing sugars and antioxidants, which can significantly distort the data in both classical biuret [2] and microbiuret [3,4] methods, in the Lowry method [5] and in the bicinchoninic acid method [6]. The Bradford method is characterized by ease of execution and availability of reagents. In fact, Bradford reagent consists of a mixture of ethanol, phosphoric acid and Coomassie G-250 dye, which was originally developed for textile dyeing [7].

Materials and methods

Materials applied in this work include: bovine serum albumin, Coomassie G-250 (Sigma, USA); $\text{C}_2\text{H}_5\text{OH}$ ("Bryntsalov", Russia); Phosphoric acid 70% (Panreac, Spain). For solution preparation we used distilled water. Spectrophotometric measurements were carried out using a UV-1800 spectrophotometer (Shimadzu, Japan). pH measurements were carried out using an Orion 120 pH-meter (Thermo, USA). The work analyzed products from different manufacturers from different countries: two samples of dry red wine, two samples of kvass, two samples of beer, two samples of cider, two samples of dry white wine. We do not indicate the names of product manufacturers to avoid conflicts of interest.

Preparation of Bradford reagent. Mix 25 mg of Coomassie G-250 pigment with 12.5 mL of ethanol. Stir the mixture for 5-10 minutes so that there are as few undissolved pigment particles as possible. Add 25 mL of concentrated phosphoric acid to the mixture in small portions (several mL), stirring each time. Dilute the resulting mixture with water to 250 mL, adding water in small portions (25-50 mL), stirring each time.

Determination of total protein. For measurements we use spectrophotometric polystyrene cuvettes with a volume of 1 mL and an optical path length of 1 cm. Add 500 μL of water (reference cuvette) or (500-X) μL of water and the calculated

X μL of protein standard solution or sample solution into the cuvette. Stir the protein solutions. Add 500 μl of Bradford reagent to all samples and stir. We keep the cuvettes for 5-10 minutes at room temperature and measure the absorption of the solution at a wavelength of 595 nm. The reference cuvette is a reagent mixture that initially contained water (500 μL) instead of a protein solution. We construct a calibration curve of absorption ($A_{595\text{ nm}}$) depending on the amount of protein in the sample. The recommended calibration range is 2–15 μg per mL. Using calibration, we determine the protein concentration in the test samples. The calibration has a nonlinear “hyperbolic form” (Figure 1).

Errors were calculated using the Student distribution for a confidence interval of 0.95. Each measurement was carried out in at least 6 repetitions.

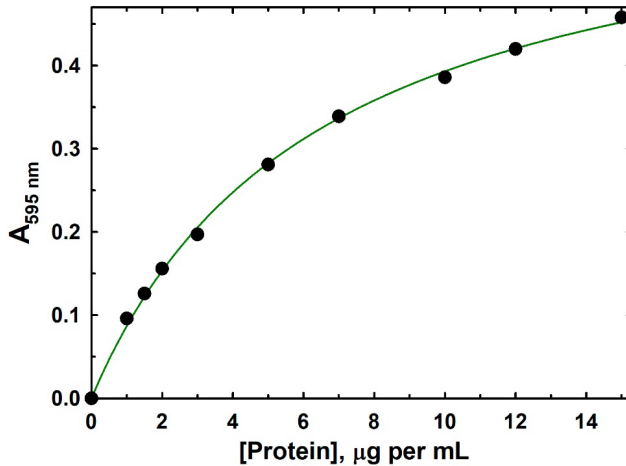


Figure 1. Calibration curve: Absorbance of a solution at a wavelength of 595 nm for different amounts of protein in the mixture.

Results

Figure 2 shows the absorption spectra of the studied fermented beverages in the visible region and in the near ultraviolet. Some fermented beverages had to be diluted with water in order to present the dependencies on the same scale. As you can see, the spectrum of red wine from different producers from different countries is very similar, which probably indicates the naturalness of the products and standardized production technology. The same can be said when comparing two different samples of kvass, two samples of beer, two samples of white wine. The absorption spectra of the two cider samples are very different, which may be due to differences in the starting materials (apples and pears) or to a violation of

the production technology. Some of the studied drugs have significant absorption at a wavelength of 595 nm, which we will further use in determining the total protein, using an appropriate correction for the sample's own absorption. Colored components in natural products often have different spectrums for protonated and deprotonated forms, at different pH values [8, 9]. In our case, all solutions have an acidic pH from 2.7 to 4.3 (Table 1). When determining protein, a mixture of water and Bradford reagent also has an acidic pH of 1.8. Thus, we can conditionally assume that the spectral characteristics of non-protein components both in the original preparations and in solution when determining protein are the same, since they correspond to the protonated forms of molecules in an acidic environment. As we can see from Table 1, the amount of protein in different samples of red wine is almost the same, which probably indicates high quality and strict adherence to manufacturing and storage conditions. In preparations from different beer and kvass manufacturers, the total protein differs by 1.5 and 2.4 times, which probably indicates an acceptable difference in the manufacturing recipe. The amount of protein in beer and kvass is similar in order to red wine, which can be explained by similar basic principles in the technology for producing all these drinks. Dry white wine showed a relatively low protein content. One of the two cider samples contained no protein at all. For white wine and cider, it is necessary to continue collecting statistics on various samples from different producers. Violations in manufacturing technology and falsification of natural products may also occur.

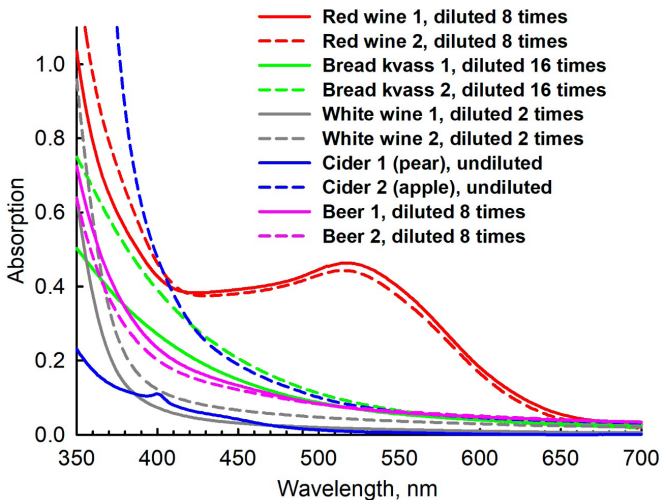


Figure 2. Absorption spectra of fermented beverages.

Table 1.*Results of total protein and pH determination in fermented beverages.*

Sample	pH	Correction for intrinsic absorption at 595 nm		Total protein, mg per L
		500 μ L of test solution	50 μ L of test solution	
Red wine 1	3.4	0.850	0.085	67 \pm 7
Red wine 2	3.3	0.775	0.078	72 \pm 6
Bread kwass 1	3.1	0.181	0.018	26 \pm 4
Bread kwass 2	3.2	0.267	0.027	61 \pm 5
White wine 1	3.1	0.010	0.001	2.0 \pm 0.5
White wine 2	3.5	0.030	0.003	2.7 \pm 0.7
Cider 1 (pear)	2.7	0.001	0.000	0.0
Cider 2 (apple)	3.3	0.024	0.002	1.9 \pm 0.6
Beer 1	4.2	0.056	0.006	85 \pm 8
Beer 2	4.3	0.037	0.004	57 \pm 7

Conclusions

Thus, it was shown that the simple Bradford method for determining the total amount of globular non-glycosylated proteins turned out to be fundamentally suitable and convenient for rapid testing of the quality of fermented beverages. The Bradford method does not detect glycosylated proteins and short peptides, so the total content of peptide components in the preparations may be higher. In the future, the express method for analyzing these products can be supplemented with other methods. Acceptable protein concentration ranges for assessing product quality in each beverage category require further research and statistics.

Funding

This work was carried out with the financial support of M.V. Lomonosov Moscow State University: Project AAAA-A21-121011290089-4 “Molecular Design, Structural and Functional Analysis and Regulation of Enzyme Systems, Cell Structures and Bionanomaterials: Fundamentals and Applications in Technology, Medicine, and Environmental Protection”.

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DOI 10.34660/INF.2024.26.82.018

不含防腐剂的二盐酸曲美他嗪溶液在各种溶出介质中的浓度稳定性考察
**INVESTIGATION OF THE CONCENTRATION STABILITY OF
TRIMETAZIDINE DIHYDROCHLORIDE SOLUTIONS PREPARED
IN VARIOUS DISSOLUTION MEDIA WITHOUT PRESERVATIVES**

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抽象的。 本文致力于研究二盐酸曲美他嗪溶液在不同溶出介质（水、酸和磷酸盐缓冲液）中的浓度如何随时间变化。 每种培养基制备了五个浓度，并在指定的时间间隔进行定量。 结果表明，在酸性环境下制备的盐酸曲美他嗪溶液最稳定。

关键词: 曲美他嗪, 溶出介质, 稳定性, pH 溶液。

Abstract. *This article is devoted to the study of how the concentrations of trimetazidine dihydrochloride solutions change over time in different dissolution media: water, acid, and phosphate buffer. Five concentrations of each medium were prepared and quantitated at specified time intervals. The results showed that the most stable solutions of trimetazidine dihydrochloride were those prepared in the acidic environment.*

Keywords: *trimetazidine, dissolution medium, stability, pH solution.*

Introduction

Trimetazidine is a lipophilic weak base with two pKa values: $pK_{a1}=4.45\pm 0.02$ and $pK_{a2}=9.14\pm 0.02$ [1]. It has very low solubility in aqueous solutions, if compared to mono or doubly protonated forms obtained in an acidic environment [2].

Trimetazidine dihydrochloride (TMD) [1-(2,3,4-trimethoxybenzyl)-piperazine dihydrochloride], molecular weight 339g (fig 1), is a hygroscopic white or almost white crystalline powder, with high solubility in water and moderate solubility in alcohol [3]. TMD, a metabolic moderator, is an effective, well-tolerated antianginal drug [4].

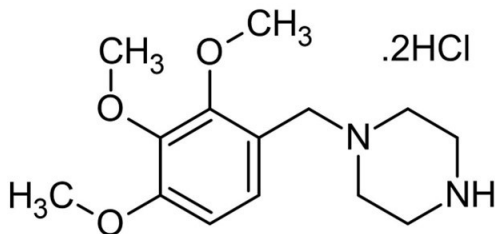


Figure 1. Trimetazidine dihydrochloride

The purpose of this study is to assess the concentration stability of TMD solutions prepared in various environments with different pH values, namely:

Acidic medium (HCl 0.1N), pH= 1.2±0.02;

Phosphate buffer, pH= 6.8±0.02;

Distilled water, pH= 7.2±0.02.

Preparation of solutions

In each medium, a stock solution of 100 mg/100 mL was prepared by accurately weighing 100 mg of TMD and dissolving it in a 100 ml volumetric flask containing approximately half the volume of solvent and stirring until TMD completely dissolved, then adding the same solvent to the mark. From each stock solution 5 concentrations were prepared in 50ml volumetric flasks, taking the required volumes of the stock solution and adding the appropriate solvent to the mark.

Select the concentrations to be prepared

Since the analytical method used for quantitation of solutions is spectrophotometry in UV area, it was necessary to determine analytical range for the solutions in each medium, i.e. the range between the minimum and maximum concentration in which the absorbance has acceptable values, namely in the range]0.1-0.9[. Thus, a series of concentrations ranging from 1–350 µg/mL were prepared from each stock solution and absorbance was measured at λ_{\max} =269 nm. It turned out that the best concentration range for preparation is [5-30] µg/mL for acidic medium, [45-75]µg/mL for buffer and [50-350] µg/mL for water. Based on this, the following solutions were prepared (table 1):

*Table 1.
Concentrations of solutions prepared in different media*

Dissolution medium	Concentration (µg /ml)				
	Solution 1	Solution 2	Solution 3	Solution 4	Solution 5
Hydrochloric acid	5	10	15	20	25
Phosphate buffer	45	50	55	60	65
Distilled water	50	100	150	200	250

Quantitation of trimetazidine dihydrochloride in prepared solutions

The concentrations of the prepared solutions were immediately determined by spectrophotometric measurement of the absorbance at $\lambda_{\max} = 269 \text{ nm}$, and then the concentration was calculated using a pre-constructed calibration curve for each medium. The solutions were then stored in tightly closed containers in a cool, dark place. At certain time intervals (1, 3, 6, 12 months), samples of each concentration of each group of solutions were taken and analyzed with a spectrophotometer at $\lambda_{\max} = 269 \text{ nm}$ (table 2).

Table 2.
Concentrations of trimetazidine dihydrochloride solutions during storage

Time interval (month)	Dissolution medium	Recovery (%)				
		Solution 1	Solution 2	Solution 3	Solution 4	Solution 5
0	acid	100.23	101.31	99.71	99.57	100.42
	buffer	99.21	100.11	98.45	99.01	100.33
	water	99.45	99.76	100.12	101.04	98.83
1	acid	98.75	98.95	98.11	97.88	99.04
	buffer	95.47	96.14	94.95	95.32	96.29
	water	90.24	89.75	90.68	91.34	90.07
3	acid	93.65	93.03	93.25	94.00	94.22
	buffer	86.35	86.67	85.97	86.07	87.29
	water	79.21	79.14	79.89	80.75	78.69
6	acid	90.89	90.93	91.26	91.59	91.68
	buffer	79.11	80.18	78.55	78.65	79.84
	water	71.13	70.98	71.56	71.32	70.91
12	acid	75.83	76.14	75.54	75.62	74.91
	buffer	61.80	61.95	61.11	62.19	62.03
	water	55.44	54.76	55.39	56.10	55.21

Comparison of changes in the concentration of solutions prepared in different dissolution media

When comparing the concentrations of various prepared solutions, it was found that TMD is more stable in solutions prepared in hydrochloric acid than in those prepared in phosphate buffer, which, in turn, are more stable than solutions prepared in distilled water.

At each time interval, the average concentration (i.e. average recovery) of the solutions in each medium was calculated, and then the average concentrations were plotted against time to obtain a graph of stability as a function of dissolution medium (fig 2).

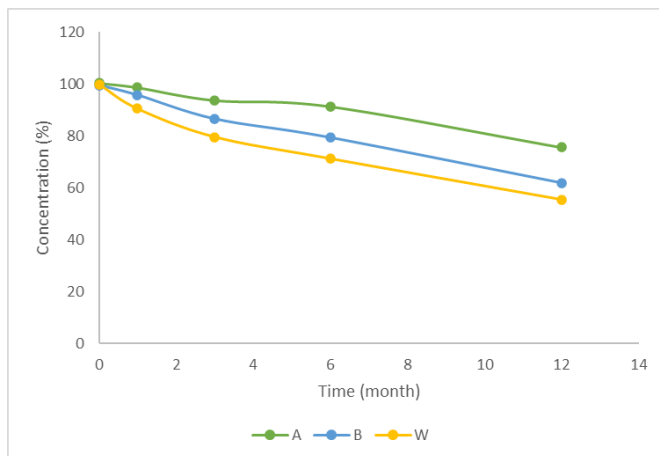


Figure 2. Change in concentration of trimetazidine dihydrochloride solutions prepared in (A) HCl 0.1 N ($pH= 1.2 \pm 0.02$), (B) phosphate buffer ($pH= 6.8 \pm 0.02$), and (W) distilled water ($pH= 7.2 \pm 0.02$)

The difference in the stability of TMD concentration during storage may be due to the differences in the pH of the dissolution environments or/ and the differences in the ionic composition of the solutions.

It should be confirmed that this study only looked at changes in concentrations, without examining other stability parameters such as microbial contamination or impurities.

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DOI 10.34660/INF.2024.35.32.019

人工智能在牙科实践中应用的机遇和前景
**OPPORTUNITIES AND PROSPECTS FOR THE USE OF
ARTIFICIAL INTELLIGENCE IN DENTAL PRACTICE**

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抽象的。人工智能是计算机使用神经网络算法根据输入和输出数据实现问题解决方案的能力，同时模仿人脑的认知能力。现代牙科预约应包括使用各种计算机程序，大大简化诊断、计划和治疗阶段，使它们更加准确和更快。

目标是研究人工智能在医学和牙科中的已知应用领域

方法。对有关在牙科实践中使用人工智能的科学文献进行了分析。

结论。牙医可以成功地使用人工智能作为额外工具来减少工作量、提高诊断准确性、疾病预后和治疗质量。

关键词：人工智能、牙科、诊断、机器学习。

Abstract. *AI is any ability of a computer, using a neural network algorithm, to achieve solutions to problems based on input and output data, while imitating the cognitive abilities of the human brain. A modern dental appointment should include the use of a variety of computer programs that greatly simplify the stages of diagnosis, planning and treatment, making them more accurate and faster.*

The goal is to study known areas of application of AI in medicine and dentistry

Methodology. *An analysis of the scientific literature on the use of artificial intelligence in dental practice was carried out.*

Conclusion. *Dentists can successfully use AI as an additional tool to reduce workload, improve diagnostic accuracy, disease prognosis and quality of treatment.*

Keywords: *artificial intelligence, dentistry, diagnostics, machine learning.*

Introduction

Currently, digital technologies have become an integral part in all spheres of human activity, relying on the rapid improvement of electronic computer technology and software, and have made a significant breakthrough over the past decades [26,28].

In everyday life, the concept of artificial intelligence (AI) is increasingly encountered. Selection of news and advertising based on interests, online customer support, and filtering of letters in email have become such familiar components of our lives that sometimes people forget that the above functions are performed by AI. And it is quite expected that AI has become a part of medicine, especially considering the fact that in recent years this area of human knowledge has undergone computerization and become more knowledge-intensive [7].

In recent years, the number of publications on the use of AI in medicine has increased significantly [1, 15].

Due to the fact that AI is a relatively new concept, there is still confusion regarding terminology. AI, machine learning, deep learning, neural networks - all these definitions are often equated with each other, which is not correct. AI is any ability of a computer to imitate human thinking. AI refers to machine learning as general and specific. The latter implies the search for an algorithm for solving problems based on input and output data. In turn, deep learning is a type of machine learning in which the amount of this data is so enormous that the search for solutions in the future will not proceed in a straightforward manner, but along so-called "neural networks." [25]

The first reports of the use of AI in medicine appeared in the 90s of the last century. [13, 16] Since then, the number of studies has increased every year. Currently, the main areas of use of AI in medicine are image evaluation, processing of laboratory and instrumental research data in order to identify pathology. [4, 17] This is due to the fact that AI-based programs, be that as it may, require the input of data that corresponds to certain formats.

In medicine, the use of AI is most often aimed at analyzing visual data (images of microslides, radiographs) and laboratory test indicators. The relevance of such use of machine learning is associated with large amounts of information, as well as the fact that the likelihood of developing various disease outcomes is complex depending on several factors.

Data were found on artificial intelligence models trained to distinguish benign and malignant breast tumors from stained biopsies. It is worth noting that in some models, identification occurs not by analyzing tumor cells, but by assessing the condition of the stroma. [5]

In addition to pathological anatomy, AI has found its place in radiology. Thus, with the help of deep learning, it became possible to identify bone fractures on x-rays. [18]

AI models are also used to predict the occurrence of clinical events based on blood biomarkers. Thus, Lacson and his colleagues proposed an AI model that predicts various cardiovascular events in patients with arterial hypertension based on the ratio of albumin to creatinine in urine, glomerular filtration rate, cholesterol and triglycerides in the blood. [12]

Dentistry as a medical field has also become more innovative. A modern dental appointment should include the use of a variety of computer programs that greatly simplify the stages of diagnosis, planning and treatment, making them more accurate and faster. In this regard, it is necessary to strengthen the degree of motivation of the professional community in continuous training, the development of additional, in-depth scientifically based approaches and standards for providing care to patients, especially with concomitant somatic pathology, using modern diagnostic and treatment technologies [27].

Results and its discussion

In modern dental practice, one can increasingly see the use of AI to automate processes. Using chatbots to book patients appointments, send visit reminders, analyze patient loyalty based on reviews, send out invitations to profs. inspections, balance analysis and ordering materials from suppliers.

The anatomy of teeth and the nature of hard tissue defects are strictly individual indicators, so simple prosthetics require high precision. A large volume of input (configuration of cavities for inlays and stumps for crowns) and output (various types of structures) data became a prerequisite for the creation of an AI system that develops a digital layout of crowns and inlays, which can also change according to both age and gender characteristics. The latter fact is associated, for example, with the fact that the height of the clinical crowns of teeth is higher in men than in women, and also with the fact that the shape of the jaws differs in people of different ages [10].

Wei-Chun Lin [14] compared wax modeling, digital modeling, and AI modeling in a number of ways. The results showed that the margin gap in the wax restoration group was 66.0–79.8 μm , which was significantly higher than that of the other two groups. The gaps in the AI and digital groups were 12.2–21.2 and 10.4–18.8 μm , respectively. It is also worth noting that the average production time for AI designs (60 sec) is 400% less than the time for making digital models (300 sec), and 900% less than the time for making models using wax (600 sec).

We found data on two AI-based programs used to evaluate dental cone beam computed tomography (CBCT) scans. These are the programs Diagnocat and Dentomo [28]. Their key feature is the fact that Russian scientists took part in their creation. Moreover, the Dentomo program is registered as a medical device.

The Diagnocat program interface is intuitive: after loading the CBCT and requesting an x-ray report, the screen automatically displays recommendations for

referral to doctors, a dental formula, as well as sections of individual areas demonstrating certain x-ray signs of pathology (Fig. 1).

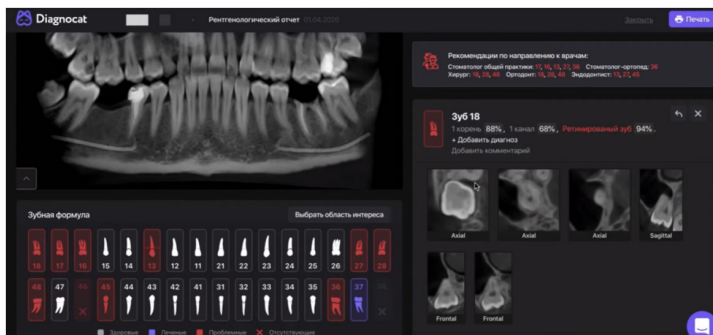


Figure 1. Diagnocat program interface

Dentomo's interface is also simple. On the CBCT analysis page, healthy teeth are highlighted in gray, treated teeth are highlighted in orange, and those with signs of pathology are highlighted in red. By clicking on a tooth, you can view the detailed results of its analysis (Fig. 2).



Figure 2. Dentomo program interface

When training these AI models, more than 2,000 CBCT scans were used, which were segmented and analyzed by dentists, after which the AI models developed an algorithm that was used to diagnose other scans.

Although these tools can only be used as an aid and not as an objective means of making a diagnosis, the performance of CTCT image evaluation in the group of

dentists using Diagnocat was higher than in the control group, according to a study [6]. Moreover, with the use of AI, diagnostic time was also reduced [22]. According to research [23], the number of errors when making diagnoses by doctors who used Diagnocat was 30% less than that of doctors from the control group.

As for the effectiveness of the Dentomo program, it has also been confirmed by research [24].

Currently, these AI models identify the following X-ray images: healthy tooth, caries, root debris, pathological abrasion, tooth dystopia, tooth retention, implant, artificial crown, filling, anchor pin, stump inlay, root canal filling, braces, retainers and etc.

It is worth noting that caries diagnosis using such AI models is difficult due to the variability of caries morphology on CBCT.

One of the factors for the success of endodontic treatment is knowledge of the anatomy of the root canals. It is often very variable. Thus, in the distal canal of the first permanent molar of the mandible there may be 1 (87.3%), 2 (16%) or 3 (0.7%) root canals. Determining the number of root canals of the distal root after opening the tooth cavity is not always possible due to various features manifested in the form of narrowing of the mouths of the root canals.

However, cone beam computed tomography (CBCT) can determine the presence of additional channels. In addition, such an assumption can be made based on the analysis of two-dimensional images.

Teruhiko Hiraiwa [9] developed AI systems to determine the presence or absence of additional root canals in the distal root of mandibular first permanent molars. CBCT and panoramic radiographs of 400 patients were selected. The number of root canals in the distal root of the mandibular first permanent molars was then determined using CBCT. Based on this, the corresponding panoramic radiographs were divided into 2 groups: in the first group, the number of root canals in the distal root of the first permanent molars of the mandible was 1, in the second - 2. Based on the input (panoramic radiographs) and output (number of root canals based on CBCT) deep learning was performed on the data. These systems were subsequently used for diagnostics. It is worth noting that the accuracy of these AI systems was higher than the accuracy of a trained physician (87.4 and 85.3 versus 81.2).

Orthodontics is also influenced by artificial intelligence as a field of dentistry, one of the pillars of which is cephalometric analysis. Some diagnostic software comes preloaded with AI models that identify anatomical landmarks, delineate cephalometric parameters, and identify skeletal classes. AI is also used for planning, calculating pressure and producing aligners [19].

Data were also found on two AI models that can determine the need to remove permanent teeth based on radiographs. These models can be used as a decision-making tool in clinical practice [11, 21].

To diagnose oral diseases, oral fluid is often used, which contains many substances (biomarkers), the quantitative content of which may indicate the presence of a particular disease. Moreover, the role of determining their content in pre-nodological diagnosis is high. A large amount of input (biomarkers of oral fluid) and output (pathological conditions of the oral cavity) data has become a prerequisite for the function of analyzing the composition of the oral fluid of patients to be transferred to AI [2].

Data were found [8] on 10 similar programs used to predict the development of caries. These programs differed from those described above in that they assessed primarily the microbiome and proteome.

There is also data on similar AI programs that can use saliva indicators to diagnose periodontal diseases, Sjögren's syndrome, osteoarthritis of the temporomandibular joint (TMJ), and oral lichen planus. [20]

We found data on 11 programs based on deep learning that allow diagnosing oral cancer using various indicators of oral fluid [3]. In all cases, the test sample was whole unstimulated saliva. The parameters assessed included the metatranscriptome (the totality of all messenger RNAs in a sample), microbiome, proteome, and various bacterial and human metabolites. These biomarkers were analyzed by sequencing, chromatography or spectroscopy. Based on the input data, the AI assigned the patient either to the group of healthy people or to the group diagnosed with oral cancer. It is worth noting that in some cases, AI could also determine the stage of disease development based on input data.

Conclusion

Thus, AI is gradually finding its place in dentistry and medicine in general. The relevance of its use is due to the large number of input data, which are various indicators of the human condition, as well as the need to computerize complex and labor-intensive processes. The quality of AI work largely depends on the quality of the data used to "train" the neural network.

However, at the current stage of development of society, AI plays far from the most key role in the diagnosis, treatment and prevention of diseases. Being an object of interest and active scientific research among doctors, AI has great prospects for use in the daily practice of dentists. Despite all the effective prospects, at the present stage AI will not be able to replace a doctor, the degree of trust in whom is determined not only by empathy, but also by the ability of clinical thinking.

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DOI 10.34660/INF.2024.15.70.020

紧急情况下的心理和精神援助(选项)
**PSYCHOLOGICAL AND PSYCHIATRIC ASSISTANCE IN
EMERGENCY SITUATIONS (OPTION)**

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抽象的。 每年,世界范围内各种类型的、影响人数众多的紧急情况都在增加。 需要对行政区域的卫生保健能力进行全面分析,考虑到卫生损失的程度和结构的形成,以组织向大规模、大规模的紧急情况中受影响的人员提供医疗服务。 人员伤亡。 突发事件数量的增加,导致社会上受各种因素影响而引起的各种精神障碍的人数不断增加。

现阶段在紧急情况下为民众组织和提供医疗护理,包括精神和心理护理,是灾害医学服务的一项复杂而紧迫的任务。 向民众提供心理和精神援助主要涉及采取准备措施,最终应尽量减少紧急情况造成的受害者人数和物质损失。

关键词:紧急情况、心理和精神护理、危险化学品(紧急化学危险物质)。

Abstract. *Every year around the world, the number of emergencies of various types with a massive number of people affected increases. There is a need for a comprehensive analysis of the healthcare capabilities of administrative territories, taking into account the formation of the magnitude and structure of sanitary losses in organizing the provision of medical care to those affected in large-scale emergency situations of various natures with mass casualties of people. The increase in the number of emergency situations leads to a constant increase in the number of people in society with various mental disorders caused by the influence of various factors.*

The organization and provision of medical care, including psychiatric and psychological care to the population in emergency situations at the present stage is a complex and urgent task of the disaster medicine service. Providing psychological and psychiatric assistance to the population primarily involves carrying out preparatory measures, which ultimately should minimize the number of victims and material damage from emergency situations.

Keywords: *emergency situations, psychological and psychiatric care, hazardous chemicals (emergency chemical hazardous substances).*

An emergency situation (ES) is a situation in a certain territory or water area that has arisen as a result of an accident, a dangerous natural phenomenon, a catastrophe, a natural or other disaster that may result or has resulted in human casualties, damage to human health or the environment, significant material losses and disruption of people's living conditions. [1]

We must not forget that in emergency situations it is necessary to organize psychological and psychiatric care for the victims. In order to implement the Law of the Russian Federation "On psychiatric care and guarantees of the rights of citizens during its provision" and improve specialized care for persons with mental disorders arising in emergency situations, the Order of the Ministry of Health of the Russian Federation dated October 24, 2002 N 325 "On psychological and psychiatric care in emergency situations", which approved the "Regulations on the organization of psychological and psychiatric care for victims in emergency situations."

The organization and provision of psychiatric and psychological assistance to the population in emergency situations at the present stage is a complex and urgent task of the disaster medicine service, which requires the involvement of medical specialists and training in the appropriate skills for providing this type of assistance to the medical staff of the Ministry of Emergency Situations, as well as the further development and improvement of relevant documentation. Psychological and psychiatric service is a system of forces and means designed to provide psychological and psychiatric assistance to victims of emergency situations and carry out (planning and organizing) activities aimed at protecting health and maintaining high performance of rescuers.

Principles of organizing effective psychological and psychiatric care for victims in emergency situations:

- proximity (deployment of forces and means to provide psychological and psychiatric assistance directly at the source of the lesion or close to it);
- urgency (providing specialized assistance as early as possible to relieve acute mental disorders and other types of pathology in order to prevent their further development;
- adequacy (reasonable choice of methods and means to effectively influence symptoms and syndromes for the purpose of correction and treatment;
- phasing (providing assistance at all stages of evacuation);
- continuity (continuity and unity of methodological approaches when carrying out treatment and preventive measures in the affected area, in the immediate and long-term periods after an emergency in order to relieve the psychological and psychiatric consequences of an emergency.

The basic elements of the psychological and psychiatric service at the epicenter of an emergency are the department of psychological and psychiatric care, the office of psychological and psychiatric care, the advisory mobile team of psychological and psychiatric care, the department of anonymous psychological and psychiatric help by telephone.

Specific pathologies affecting the population in natural and man-made emergencies are psychoneurological: stress, shock, stupor. ICD-10 introduced such nosological units as “Post-traumatic stress disorder” (F 43.1) and “Chronic personality changes after experiencing a disaster” (F 62.0).

Approximately 10-15% of those affected require hospital treatment in psychoneurological hospitals and at least 50% in outpatient clinics. The primary task in these cases is to identify victims with psychomotor agitation, ensure the safety of them and those around them, eliminate the situation of confusion, and eliminate the possibility of mass panic reactions. The organization and provision of psychiatric and psychological assistance to the population in emergency situations at the present stage is a complex and urgent task of the disaster medicine service.

The bulk of those affected by the psychiatric profile will be represented by people with reactive states, as well as with exacerbation of chronic mental illnesses (development of acute psychoses in schizophrenia, MDP, increased frequency of convulsive attacks in epilepsy). Due to the characteristics of this contingent of affected people, a significant number of personnel will be required to hold them and monitor them due to the fact that these affected people, due to their mental state, will pose a danger to both themselves and others. Reactive psychoses are a variety of psychotic-level disorders that arise as a result of mental trauma that exceeds the adaptive and compensatory capabilities of the individual. In cases of emergency, the most common may be affective-psychogenic shock reactions, which can manifest themselves as a hypokinetic variant (emotional-motor retardation with symptoms of general “numbness”), and hyperkinetic (acute psychomotor agitation, which develops against a background of rapidly increasing anxiety and fear caused by traumatic experiences).

With reactive depression, those affected may make suicidal attempts, and therefore it is necessary to pay attention to them during observation. Not only for themselves, but also for those around them, those affected with reactive paranoids can present themselves, given that in this case the content of hallucinations is always affectively colored. Those affected hear the voices of children and relatives asking for help, and so-called delirium often arises without the guilt of the perpetrator. It should be emphasized that timely treatment of those affected with reactive psychoses quickly leads to the reverse development of psychosis. Therefore, the role of timely evacuation of those affected to a medical facility is important here.

Persons with impaired consciousness, thinking, motor restlessness, severe depression after first medical aid are subject to referral to a neuropsychiatric hospital.

Victims with severe neurological symptoms, but in the absence of clear impairments of consciousness, thinking, and motor function, may be delayed at the first stage of medical evacuation for up to 1 day for medical observation.

The department of psychological and psychiatric assistance by telephone in emergency situations (hotline) is part of the emergency psychiatric and psychological assistance service in emergency situations. If necessary, doctors of the psychological and psychiatric care service should recommend that a person calling by phone visit a psychiatrist at his place of residence, a psychiatrist (psychotherapist) in his office, or a doctor in the department of emergency psychological and psychiatric care in emergency situations.

The advisory medical team for psychological and psychiatric care in emergency situations (hereinafter referred to as the medical teams for psychiatric care in emergencies) are part of the psychological and psychiatric service and report to its head. The tasks performed by the medical team are primarily determined by the specifics of providing assistance to victims of emergencies. Team members must take into account not only the required volume of assistance provided, but the very nature of the emergency

Knowledge of the nature of the emergency is necessary, since in man-made emergencies, sometimes victims show aggression towards persons who seek to provide first aid (including doctors), identifying them with persons who, in the opinion of the victims, are to blame for the emergency. Team members should also take into account the fact that many emergency victims during an acute reaction to stress, especially during the period once the threat to the victim's life has passed, may experience a heroic phase when the victim, along with an increase in the background mood, experiences a decrease in criticism towards situations and reducing the feeling of danger. They often, on their own initiative, begin to interfere in rescue operations, endangering their lives and the lives of others.

The emergency psychiatric care team provides psychiatric care to persons with mental and behavioral disorders resulting from large-scale and individual emergencies. In addition, the team provides assistance to persons with combined mental and somatic pathologies; persons with somatic disorders accompanied by mental disorders. The team's doctors examine a person without his consent or without the consent of his legal representative and involuntarily hospitalize him in accordance with current legislation. The team also transports persons suffering from mental disorders to appropriate treatment facilities or other institutions. Medical teams of psychiatric care in emergencies carry out their work in collaboration with offices (departments) of psychological and psychiatric care in emergencies, psychoneurological dispensaries and psychiatric hospitals and, if necessary, provide them with relevant information and recommendations.

Psychiatrists (psychotherapists) must also provide outpatient visits. As practice shows, the number of people who seek psychological and psychiatric help

during emergencies is determined not by the true need for this type of help, but by the location of the psychiatrist's office. Therefore, it is necessary to carefully consider where the psychiatrist (psychotherapist) should conduct the appointment. In some cases, it is advisable to conduct a reception in the same building (and, if possible, in the same compartment) where the victims are provided with financial assistance. In other cases, it is more justified to conduct an outpatient appointment in a city (district) clinic, since part of the population with complaints of "poor health" often goes there. [3]

The general principle of medical evacuation support in conditions of a disaster is basically a two-stage system of providing medical care and treatment of the injured with their evacuation to their destination. The surviving on-site medical personnel and treatment and preventive healthcare institutions in and near the outbreak are, as a rule, insufficient for this purpose. Moving large medical healthcare institutions from outside to the disaster area in a short time is practically impossible, since they do not have the mobility necessary for this. The capabilities of emergency medical care, as the most mobile formation of healthcare, in large outbreaks are also limited and are quickly drying up. To strengthen it, treatment and preventive institutions are forced to allocate part of their medical personnel from their composition, creating from them mobile highly mobile medical units of varying degrees of readiness for deployment to the disaster area (emergency medical teams, emergency specialized medical care teams, medical teams, mobile hospitals, etc.), as well as to use the treatment and preventive institutions that have been preserved in the outbreak or near it.

When organizing psychological and psychiatric care, the tasks of several stages of medical evacuation are solved: first medical aid; qualified and specialized assistance.

First medical aid includes relief of acute psychotic symptoms, medical triage and preparation of victims with severe mental disorders for evacuation to their destination. The peculiarity of this option of psychological assistance is that it is provided not by psychiatrists, but mainly by rescuers, ambulance teams and doctors of other specialties in difficult conditions and within a limited time frame. First medical aid is necessary for 65% of victims with mild and up to 100% with severe psychogenic disorders.

Victims with severe symptoms in the absence of clear disturbances of consciousness, thinking, motor sphere, or emotional disorders may be detained at the 1st stage of medical evacuation for a short period (up to 24 hours) for medical observation. In case of recovery (improvement of condition), they return to performing normal duties. Identifying this group is extremely important for a number of reasons:

- this ensures the involvement of a significant number of people in rescue and emergency recovery work;

- the irrational use of transport for evacuating them to the hospital base is excluded;

- the load on psychoneurological hospitals is reduced.

Qualified assistance with elements of specialized assistance at the source of the lesion or near it in the event of a mass influx of victims includes making an accurate diagnosis, an objective assessment of emerging reactions and conditions, predicting possible mental disorders, conducting qualified triage of all victims, distributing them into groups and providing them with adequate assistance.

First of all, assistance is provided to persons who pose a danger to themselves and others (those affected by impaired consciousness, disorganization of thinking with severe psychomotor agitation or stupor, i.e., in an acute psychotic state).

In the second place, assistance is provided to those for whom it can be delayed in time, and who, due to their mental state, are available for evacuation.

In the last place, psychiatric care is provided to those in need of psychological and psychiatric support (persons with psychologically understandable reactions, mild forms of mental disorders).

3. Specialized care includes treatment and rehabilitation of victims in medical institutions of the system of psychiatric care to the population. [4]

According to our research, there are difficulties in organizing assistance to those affected, due to the departmental and structural disunity of institutions and units directly involved in eliminating the health consequences of emergency situations. Often, especially at the regional level, there is incomplete provision of institutions and units with equipment and medicines and insufficient practical readiness of personnel to carry out medical and sanitary measures. In our opinion, it is assumed that it is expedient and necessary to make a number of adjustments to the organization of the system of providing medical care to victims.

In our opinion, this issue can be resolved to a certain extent by using sanatorium-resort, preventive institutions and health centers to provide medical care, treatment and rehabilitation to victims of emergency situations, subject to advance planning of the system and organizational and functional restructuring of their work in emergency conditions situations.

What is the justification for the provision of qualified and specialized medical care in sanatorium-resort institutions and other health institutions?

Firstly. The impossibility of timely and sufficient number of beds in medical institutions to accommodate victims. According to the medical and sanitary forecast, even with the full allocation of all therapeutic hospital beds, the shortage in certain risk zones could be up to 96% for adults and 87% for children.

Secondly. Inability to release. In real conditions, therapeutic hospitals are filled 85-95% with seriously ill patients who cannot be discharged for outpatient treatment.

Thirdly. In our specialized literature and regulatory documents, it is recommended to use hospitals for these purposes, deployed on the basis of “some” institutions, including and schools. How can this be imagined in terms of the time factor, not to mention material support, bed capacity, medical and sanitary equipment, etc.?

Fourthly, institutions with a sufficient number of beds, equipment and equipment, all conditions for catering, sanitary and hygienic provision, with timely developed planning, reorganization of their work in an emergency situation, as well as strengthening appropriate forces and means.

Fifthly, some of the medical institutions may find themselves in an emergency zone and will be unable to receive victims. [2]

In emergency situations, we suggest using medical and recreational facilities as additional bed capacity. In this case, the issue of the possible location of the department of psychological and psychiatric care, the office of psychological and psychiatric care, and the advisory mobile team of psychological and psychiatric care is being resolved. In addition, when carrying out medicinal measures in a psychological and psychiatric direction, it must be taken into account that when drugs are administered to affected hazardous substances (provoking factor), the development of toxic pulmonary edema is possible and it is necessary to provide psychiatric care in the presence of a toxicological-therapeutic team.

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硬膜外电刺激坐骨神经和股神经神经病患者

EPIDURAL ELECTRICAL STIMULATION IN PATIENTS WITH NEUROPATHIES SCIATIC AND FEMORAL NERVES

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Relevance. Restoring the functional capabilities of the limb, as well as the treatment of pain syndromes caused by injury and traction of peripheral nerves, still remains a complex and not fully resolved issue. In recent years, stimulation methods have been widely used, including direct electrical stimulation of nerve trunks. This method does not have a sufficient evidence base in terms of short-term and long-term effectiveness of use, but is promising.

Over the past decades, there has been a steady increase in the frequency of road traffic accidents, work-related injuries, household injuries, accidents and natural disasters. A special place is occupied by sciatic nerve palsies due to fractures of the pelvic and femoral bones [1, 2], and is one of the most difficult complications to treat. The cause of paresis is compression of the sciatic nerve by scars and adhesions, hematoma [3], as well as compression between bone fragments. The incidence of sciatic nerve injuries due to acetabulum fracture ranges from 10 to 20% and increases to 40% with unstable vertical displacement of bones in the posterior semi-ring [4, 5].

One of the complications of total endoprosthesis is damage to the sciatic and femoral nerves. The frequency of complications in the form of damage to the sciatic, femoral, superior gluteal, and obturator nerves of the thigh after total hip replacement varies from 0.6 to 5.2%.

Neuropathy is long-lasting and in most cases leads to unpleasant social problems [9, 10, 11, 12]. Restoration of limb functionality, as well as treatment of pain syndromes, remains a complex and unresolved issue, including in the reconstruction of the acetabulum [13, 14].

In the absence of compression of peripheral nerves, it is necessary to use the method of electrical stimulation when identifying the first signs of neuropathy, especially in older patients [15]. The central role of nerve conduction in restoring axonal regeneration is known. Timing is important in patients with proximal levels of injury when the distal target, the muscle, must be reinnervated before irreversible changes occur. Electromyography provides an effective aid in determining the processes of degeneration or regeneration. Currently, along with stimulation of denervated muscles through superficial (cutaneous) electrodes, implantation of electrodes, including miniature electrical stimulators, is used [16, 17]. The viability of the affected peripheral nerve bundles persists longer than previously thought, which allows the time of possible recovery to be extended [18]. The main task of neurosurgeons, neurologists, rehabilitation specialists and physiologists is not to lose the potential of peripheral nerve function and to accelerate the process of restoration of denervated muscles, to promote and maintain the transmission of excitation in the autonomic ganglia, and to eliminate synaptic block. In clinical practice, stimulation methods are used: interstitial electrical stimulation and direct electrical stimulation of nerve trunks [19, 20]. When the first signs of regeneration appear, such as muscle soreness during palpation and/or barely noticeable contractions, the appearance of gross pain sensitivity in the anesthesia zone, prolonged electrical stimulation of the posterior columns of the spinal cord with implanted electrodes is effective. However, the authors [21] draw attention to complications, the need for reimplantation of electrodes and the high cost of this treatment option.

Materials and methods. At the Federal State Budgetary Institution “National Medical Research Center for Tomorrow named after Academician G.A. Ilizarov” of the Ministry of Health of Russia, minimally invasive surgical intervention is performed for patients with neurological deficiency of the sciatic nerve, mainly of the peroneal portion, and the femoral nerves after hip replacement, as well as traumatic damage to the pelvic ring. For the treatment of this category of patients, courses of electrical stimulation using implanted epidural electrodes at the lumbar level were chosen. Depending on the initial neurological deficit, from 1 to 6 courses of electrical stimulation were carried out, and 215 implantations of single-channel electrodes were analyzed. The dynamics of restoration of nerve function in patients with neuropathies after endoprosthetics, including revision, as well as patients with consequences of acetabular injuries were assessed.

Results. Statistical analysis was carried out using the StatTech v. program. 2.8.3 (developer - Stattekh LLC, Russia). Quantitative indicators were assessed for compliance with normal distribution using the Shapiro-Wilk test (for the number of subjects less than 50) or the Kolmogorov-Smirnov test (for the number of subjects more than 50). In the absence of a normal distribution, quantitative data were described using the median (Me) and lower and upper quartiles (Q1–Q3).

Categorical data were described using absolute values and percentages. Comparison of two groups for quantitative indicators whose distribution differed from normal was performed using the Mann-Whitney U test. Comparison of percentages in the analysis of four-field contingency tables was carried out using the Pearson chi-square test (for values of the expected phenomenon more than 10). Comparison of percentages in the analysis of multifield contingency tables was performed using the Pearson chi-square test.

All patients showed the same type of response to the treatment in the form of an increase in the patient's muscle strength and a decrease in sensory disorders under the influence of electrical impulses with amplitude of 10–20 mA, a frequency of 40–60 Hz, and duration of exposure of 15 minutes. In the presence of pain according to VAS 9.3 ± 0.3 , the first course of combined electrical stimulation using implanted electrodes is aimed at reducing pain with a frequency of 90 Hz or more, duration of exposure 15 minutes, for 2 weeks. In this case, the intensity of the pain syndrome decreases in 60% of cases to a VAS of 4.1 ± 0.5 . The repeated course is aimed at reducing the neurological deficit from M0 - M1 to M2 - M3. Reduction of sensory disorders from S0–S1 to S2–S3. All patients received a course of comprehensive rehabilitation treatment, exercise therapy according to an individual program, massage of the lower extremities, courses of electrical stimulation, vascular and antispasmodic therapy, and physiotherapy. Patients showed regression of neurological symptoms during subsequent courses of electrical stimulation up to M4 – M5, sensitivity up to S4 – S5.

The treatment results were confirmed by positive dynamics according to EMG data. At the time of completion of the course of combined electrical stimulation, the amplitude of motor responses of the muscles of the affected limb increased by an average of 36.0%, the average amplitude of the total EMG increased by 21.2% ($p < 0.001$), and the frequency of oscillations - by 24.8% ($p < 0.001$). During the first year after completion of treatment, the amplitude of M-responses was characterized by pronounced positive dynamics - up to a 4-fold increase ($p < 0.01$) in the indicator. The values of the average amplitude of the total EMG increased relative to the previous period of examination by 180.1% ($p < 0.001$). Previously, before using the method of electrical stimulation in patients with neuropathies due to endoprosthetics / osteosynthesis of the pelvic bones, patients were prescribed conservative therapy for regression of neurological symptoms, in which satisfactory results were achieved in 1/3 of cases, which suggests the effectiveness of the electrical stimulation used.

Discussion. Researchers describing neuropathy after endoprosthetics point to a persistent neurological deficit, which in most cases is associated with traction, less often with ischemic effects on the peripheral nerve; electrical stimulation of the peripheral nerve is generally accepted, in which the electrode is applied open-

ly to the nerve, removed through the skin and within 2 weeks, they continue the course of treatment, which accelerates the regeneration process [22], use cutaneous electrical stimulation, as well as stimulation of the spinal cord in the presence of neuropathic pain [23, 24, 25], and use implanted versions of electrodes, including multichannel ones.

The effect of electrical stimulation on peripheral remyelination after nerve injury has been less studied; published experimental research suggests that the use of electrical stimulation potentiates axonal regrowth and myelin maturation during peripheral nerve regeneration [26]. A combination of endoscopic neurolysis and implantation of a multichannel electrode under the epineural sheath has been developed; the authors note a reduction in pain by more than 50%, however, persistent neurological deficit in the form of paresis of up to 2-3 points in the muscles innervated by the peripheral nerve remains [27]. With percutaneous insertion of the electrode, there may be a puncture of the dura mater, while 56 - 60% of doctors continue the procedure at another level, 10% perform it at the same level, and the rest postpone the procedure, choosing other treatment methods [28].

In this regard, we have developed and clinically tested courses of temporary electrical stimulation using implanted epidural electrodes at the level of a clinically significant segment, under X-ray control, and justified repeated courses of electrical stimulation leading to a gradual restoration of muscle strength in cases of peripheral nerve damage.

The study was carried out on a sufficient number of patients of different age groups; the degree of ischemia of the bundle groups as a result of traction and compression factors is important.

More than 10% of patients were included in the longitudinal study group - a long-term clinical study of more than 3 years, which maintained long-term periodic observation of the same individuals. The development of neuropathy of the sciatic and femoral nerve, especially during the implantation of revision prostheses, is facilitated by scars in the revision zone, intraoperative technical maneuvers and access features, taking the nerve on holders, compression of the nerve by metal structures, elements of the endoprosthesis, in the area of the acetabulum, infrapiriform space. Avoid hip flexion during acetabular retraction when using a posterior approach with posterior hip dislocation.

Conclusion. In the absence of indications for revision interventions aimed at decompressing the sciatic nerve, preference should be given to a course of direct epidural electrical stimulation via implanted epidural single-channel electrodes for subsequent electrical stimulation in the postoperative period (combined electrical stimulation was carried out via electrodes and cutaneous leads in the zone of autonomous innervation).

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使用由具有生物涂层的纳米结构二氧化锆制成的已开发牙种植体的临床和功能合理性

CLINICAL AND FUNCTIONAL JUSTIFICATION OF THE USE OF THE DEVELOPED DENTAL IMPLANTS MADE OF NANOSTRUCTURED ZIRCONIUM DIOXIDE WITH BIO-COATING

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注解。 研究主题——将研发的骨内全瓷螺钉一期即刻种植引入部分缺牙和完全缺牙患者骨科康复临床的前景。

目标——分析所开发的由纳米结构二氧化锆制成的牙种植体在牙科实践中的5年临床使用结果。

方法。 该研究以克麦罗沃市的牙科诊所 Stoma LLC 为基础进行,利用医疗记录进行统计分析。 为了客观评估所获得的结果并确定概率程度,所有研究数据均按照临床医学公认的方法进行统计处理。

通过检验原假设和备择假设来确定数据之间的相似性和不一致。 可能的误差选定的显着性水平为0.05,即拒绝原假设,数值差异的可靠性为0.95或95%。

结果。 介绍了使用基于纳米结构二氧化锆的牙种植体(进口和开发的生物种植体)和基于钛合金的种植体治疗部分和完全缺牙患者的结果。

对这些患者组的比较统计分析显示,接受进口类似物的患者出现不良治疗结果的频率,以及使用纳米结构二氧化锆制成的牙种植体的患者出现不良治疗结果的频率。 确定了所开发的由纳米结构二氧化锆制成的牙种植体崩解的相对风险和绝对风险的比率、优势比以及需要使用所开发的牙种植体的患者数量。

结论。 根据所提供的数据,我们可以得出结论,所开发的由纳米结构二氧化锆制成的牙种植体可提供更稳定的近期和长期临床结果。 术后早期临时修复体和骨组织可靠稳定的可能性为患者牙列的早期修复创造了条件。 所进行的研究使我们能够推荐在临床牙科中使用由具有生物涂层的纳米结构二氧化锆制成的已开发牙种植体。

关键词: 陶瓷种植体、二氧化锆种植体、微创种植、种植治疗、生物种植、新进展。

Annotation. Subject of study– *the prospects of introducing the developed endosseous all-ceramic screw one-stage immediate implant into the clinical practice of orthopedic rehabilitation of patients with partial and complete absence of teeth.*

Target– *analyze 5-year results of clinical use of the developed dental implant made of nanostructured zirconium dioxide in dental practice.*

Methodology. *The study was carried out on the basis of the dental clinic Stoma LLC in the city of Kemerovo, statistical analysis was carried out using medical records. To objectively assess the results obtained and determine the degree of probability, all study data were processed statistically in accordance with methods accepted in clinical medicine.*

The determination of similarity and disagreement between the data was carried out by testing the null and alternative hypotheses. The selected significance level for the possible error was 0.05, i.e., rejection of the null hypothesis, and the reliability of the differences in values was 0.95 or 95%.

Results. *The results of treatment of patients with partial and complete absence of teeth using dental implants based on nanostructured zirconium dioxide (both imported and developed bio-implants) and implants based on titanium alloys are presented.*

A comparative statistical analysis of these groups of patients showed the frequency of unfavorable treatment outcomes in patients who received imported analogues, and the frequency of unfavorable treatment outcomes in the group of patients with developed dental implants made of nanostructured zirconium dioxide. The ratio of the relative and absolute risks of disintegration of the developed dental implants made of nanostructured zirconium dioxide, the odds ratio and the number of patients requiring the use of the developed dental implant were determined.

Conclusions. *Based on the presented data, we can conclude that the developed dental implant made of nanostructured zirconium dioxide gives more stable immediate and long-term clinical results. The possibility of temporary prosthetics and reliable stabilization in bone tissue in the early postoperative period create conditions for early restoration of the dentition in patients. The performed*

study allows us to recommend the use of the developed dental implant made of nanostructured zirconium dioxide with bio-coating in clinical dentistry.

Keywords: *ceramic implants, zirconium dioxide implants, minimally invasive implantation, implantological treatment, bio-implant, new developments.*

Introduction

The aesthetic component of craniomaxillofacial surgery, the complexity of the anatomy and the sensitivity of the systems involved determine the difficulties and complications that arise in the field of implant application [1], and explain the relevance of a personalized approach to the creation of a dental implant, taking into account the dental and somatic status of the patient [3]. Existing complications arising from dental implantation require research and development in order to improve the effectiveness of orthopedic rehabilitation [5, 6].

In modern dental practice, dental implantation is one of the most established methods of restoring edentulous areas of the jaws using endosseous titanium implants. However, a number of studies have found that titanium alloy causes the development of inflammation in surrounding tissues, which leads to further expression of certain mediators and causes the persistence of a state of chronic inflammation due to constant stimulation of the immune system. These triggers lead to the activation of those signaling pathways that increase susceptibility to the development of cancer and autoimmune diseases. In earlier publications, this process of chronic inflammation was verified as “fatty degenerative osteonecrosis” in the bone marrow space of the jaws. Considering the shortcomings of titanium alloys and the growing needs of patients for safe and reliable dental implantation, for metal-free solutions for orthopedic rehabilitation, the development of new biocompatible materials, new technologies for obtaining surfaces with a given micro-roughness, new technologies for applying bio-coatings to the surface of a dental implant made of zirconium dioxide and improving clinical protocols made it possible to use such zirconia implants as a reliable alternative to their titanium counterparts [4, 7, 8]. Numerous studies show that the clinical use of zirconia implants is practically not accompanied by manifestations of peri-implantitis, and the epithelial tissues of the gums are able to firmly and reliably attach to their surface. The integration of the ceramic implant into bone and soft tissue has been tested and confirmed. Separately, it should be noted the rapid growth of soft gum tissue on the surface of a ceramic dental implant [2, 9].

Taking into account all the advantages of using zirconium dioxide as a material for the manufacture of dental implants, having studied the available modern technologies, I. A. A. Dovgerd, developed and introduced a new endosseous all-ceramic screw one-stage immediate implant (RF Patent for invention No. 2651052; Eurasian Patent No. 035482).

Purpose of the study— analyze 5-year results of clinical use of the developed dental implant made of nanostructured zirconium dioxide in dental practice.

Materials and methods

To assess the demand for treatment using dental implants, more than four thousand patient requests to the Kemerovo dental clinic Stoma LLC for orthopedic rehabilitation were analyzed. The study was carried out in two stages. At the first stage, the demand for minimally invasive dental implantation was determined by surveying 4,118 patients who applied to dental clinics. The objective of the second stage of the study was to evaluate the effectiveness of the clinical use of a new type of ceramic bio-implant. In this regard, two groups of patients requiring one-stage tooth root removal and implantation (minimally invasive technique) were created. The first group (main group) consisted of patients who received 624 ceramic implants based on zirconium dioxide (both imported and patented bio-implants); the second (control group) included patients who preferred implants based on titanium alloys; they received 1223 implants. The criterion for the effectiveness of treatment of edentulous patients using dental implants in both groups was the disintegration of dental implants.

Statistical processing was carried out using the IBM SPSS Statistica 26 program. Compliance with the normal law was checked using the Kolmogorov-Smirnov tests with the Lilliefors correction. If the characteristic was normally distributed, the data were presented as the arithmetic mean and standard deviation (M(SD)); if the indicator deviated from the normal distribution, the median (Me), 25th and 75th percentiles (Q1;Q3) were calculated. To determine statistically significant differences, the Mann-Whitney test was used for two unrelated groups, the Wilcoxon test for two related groups, and the Friedman test for more than three related groups.

Qualitative indicators are presented in absolute values with an indication of the share. To calculate the statistical significance of differences in qualitative characteristics, the Pearson χ^2 test was used if the number of observations in any of the cells of this table was 10 or more; the Yates correction for continuity was used if the number of observations was from 5 to 9, if the number of observations was less than 5 in any of the cells—Fisher's point test.

To assess outcomes, the following indicators were assessed: the frequency of adverse treatment outcomes in each study group, relative risk with 95% CI, relative risk reduction (RRR), absolute risk reduction (ARR), number of patients requiring a specific type of intervention (NNT), odds ratio indicating 95% CI. Calculations were carried out in the MedCalc program. The chosen level of statistical significance was less than 0.05.

Research results and discussion

During the period from 2019 to 2023, 1,243 patients were operated on in dental clinics in the city of Kemerovo, and a total of 1,847 dental implants were installed

(624 ceramic (based on zirconium dioxide) and 1,223 based on titanium alloys) in the presence of partial and complete (primary and secondary) adentia, simultaneously with tooth extraction, as well as installed in combination with various techniques of bone grafting (using various types of bone substitutes) and modeling of soft gum tissue (various autotransplantation techniques). In addition, a comparative analysis was carried out with clinical observations of foreign colleagues; an increase in patient demands for shorter treatment periods was identified; reducing the volume and number of surgical stages in treatment; an increase in the incidence of intolerance to titanium alloys and allergic reactions, as well as various intolerances to the bone substitutes used.

The average age of patients who underwent dental implantation was 39.6 (5.5) years, of which 75.7% were women (n=178) and 24.3% were men (n=57).

To conduct a comparative analysis of the effectiveness of clinical use of the developed dental all-ceramic immediate implant with a bioactive coating, two groups of patients were created. The comparison group included patients who received imported ceramic dental implants, and the study group included patients who received developed dental ceramic implants (p <0.001) (Table 1).

Table 1

Distribution of the number of installed imported ceramic dental implants and developed all-ceramic dental implants

Years Type of implant	2019	2020	2021	2022	2023	Total
Imported implants	37 (5.93%)	33 (5.29%)	20 (3.21%)	17 (2.72%)	10 (1.60%)	117 (18.75%)
Developed implants	68 (10.90%)	85 (13.62%)	108 (17.31%)	122 (19.55%)	124 (19.87%)	507 (81.25%)
Total	105 (16.83%)	118 (18.91%)	128 (20.52%)	139 (22.27%)	134 (21.47%)	624 (100%)
p-value	<0.001	0.005	0.310	0.026	<0.001	<0.001

Clinical observations of patients who had 507 developed ceramic dental implants installed over a period of 5 years showed the high efficiency of direct-load prosthetics.

Over a five-year period, disintegration of developed dental ceramic implants due to failure of osseointegration processes was detected in 8 cases (1.58%). The vast majority of developed dental ceramic implants (499 units) were integrated into the bone tissue, immobile, and were surrounded by peri-implant gum without signs of inflammation.

PTV values after installation of the developed dental ceramic implant increased by 18.0% during the first month, with a further decrease by 38.0% (p<0.01). As a result, the dynamics of changes over 4 months amounted to 24.0% (p<0.01).

Mucositis in the area of the installed developed dental ceramic implant was detected after 1 year in one patient (0.2%) and was eliminated with local anti-inflammatory treatment.

Analysis of index indicators of the state of peri-implant tissues in the area of the installed developed dental ceramic implant (Table 5) did not reveal inflammation: after a year, Igim was 0.90 (0.90; 1.00); IG - 0.10(0.10; 0.10); Mulleman index - 0.10(0.10; 0.10). After 5 years, the Igim value was 0.75(0.50; 0.90); IG - 0.00(0.10;0.10), Mulleman index - 0.10(0.10;0.10). Statistically significant differences were found for IGR-U – 1.65(1.00; 1.80), 2.00(1.70;2.00) ($p < 0.001$).

During the radiation study, the vertical decrease in bone level in the area of the installed developed dental ceramic implant averaged 0.45(0.18) mm, and after 5 years – 0.56(0.20) mm ($p < 0.01$) did not exceed normal changes under direct loading of dental implants. There were no signs of peri-implantitis in the area of installed developed dental ceramic implants.

The developed dental ceramic implant, thanks to special surface treatment, does not require the use of bone replacement drugs when installed in the socket of an extracted tooth, in cases of simultaneous dental implantation and closed sinus lift, which expands its indications for minimally invasive techniques in patients, since the coating is made of hydroxyapatite calcium is the building material of bone tissue (Table 6).

Table 6
Distribution of disintegrated ceramic dental implants in the comparison group and the study group for the period 2018-2022.

Years Type of implant	2019	2020	2021	2022	2023	Total
Imported implants	15 (27.78%)	13 (24.07%)	8 (14.81%)	8 (14.81%)	2 (3.70%)	46 (85.17%)
Developed implants	2 (3.71%)	2 (3.71%)	1 (1.85%)	1 (1.85%)	2 (3.71%)	8 (14.83%)
Total	17 (31.49%)	15 (27.78%)	9 (16.66%)	9 (16.66%)	4 (7.41%)	54 (100.0%)

A comparison of these groups demonstrated: the frequency of unfavorable treatment outcomes in the group with imported implants was 0.393; the frequency of unfavorable treatment outcomes in the group with implants developed by us was 0.158. The relative risk was 1.622 [95% CI 1.401-1.877]: the use of the developed implant is accompanied by a reduction in the risk of disintegration of ceramic dental implants, statistically significantly 1.62 times more often than in the imported implant group ($p < 0.001$):

- relative risk reduction (RR) – 59.8%;
- absolute risk reduction (ARR) – 23.5%;

- the number of patients requiring the use of the developed implant (NNT) – 2.65 [95% CI 2.35-3.04];

- odds ratio – 40.41 [95% CI 18.32-89.12], $p < 0.001$.

Based on the presented data, we can conclude that the dental ceramic implant we developed provides more stable immediate and long-term clinical results. The possibility of temporary prosthetics and reliable stabilization in bone tissue in the early postoperative period create conditions for early restoration of the dentition in patients.

Conclusion. Ceramic implants based on zirconium dioxide, including the developed bioimplant, are in demand by patients. In addition, the developed implant, thanks to special surface treatment, does not require the use of bone replacement drugs, which expands its indications for minimally invasive (one-stage removal and implant installation) techniques in all groups of patients, since calcium hydroxyapatite is a building material for bone tissue. This implant has a better aesthetic appearance and is easier to use in practice (the implant is not dismountable). In addition, it has a lower cost (three times cheaper than analog imported ceramic and an order of magnitude cheaper than titanium), which makes it more attractive for patients. All of the above allows us to consider the developed bio-implant promising.

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在安装的金属结构背景下, 重复手术干预期间患有脊柱和胸部先天畸形的儿童的
脊柱分割

SPINAL SEGMENTATION IN CHILDREN WITH CONGENITAL DEFORMITIES OF THE SPINE AND THORAX DURING REPEATED SURGICAL INTERVENTIONS AGAINST THE BACKGROUND OF THE INSTALLED METAL STRUCTURE

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抽象的。对植入金属的先天性脊柱和胸部畸形儿童进行重复手术对从计算机断层扫描图像中准确分割脊柱提出了挑战。金属伪影会扭曲图像, 导致难以创建用于手术规划的 3D 模型。该研究分析了 45 名儿童的 CT 图像, 并确定了分割的特点和困难。结果表明, 伪影对模型的准确性有显著影响, 需要开发专门的分割方法, 同时考虑金属类型和个体患者特征。

关键词: 脊柱分割、先天性脊柱畸形、先天性胸椎畸形、金属、计算机断层扫描、3D 建模、儿童、重复手术。

Abstract. *Repeat surgeries in children with congenital spinal and thoracic deformities who have implanted metal pose the challenge of accurate spinal segmentation from computed tomography images. Metal artifacts distort images, making it difficult to create 3D models for surgical planning. The study analyzed CT images of 45 children and identified the features and difficulties of segmentation. The results showed a significant impact of artifacts on the accuracy of models, requiring the development of specialized segmentation methods taking into account the type of metal and individual patient characteristics.*

Keywords: *spinal segmentation, congenital spinal deformity, congenital thoracic deformity, metal, computed tomography, 3D modeling, children, repeated surgeries.*

Introduction

Congenital deformities of the spine and thorax in children often require surgical intervention with the placement of metal to stabilize and correct the deformities. When repeated surgeries are necessary, accurate spinal segmentation on CT

images becomes critical for surgical planning and risk assessment. However, the presence of metal structures leads to the formation of artifacts on images that distort anatomical structures and complicate the segmentation process [1].

Purpose of the study

To evaluate the difficulties and peculiarities of spinal segmentation in children with congenital deformities during repeated surgeries with implanted metal.

Materials and methods

The study included 45 children (23 boys, 22 girls) aged 6 to 14 years who had previously undergone surgery with metal on the spine for congenital deformities of the spine and thorax (scoliosis, kyphosis). Inclusion criteria: presence of metal structures on the spine, need for repeated surgical intervention, age from 1 to 18 years. Exclusion criteria included the presence of other metal implants in the study area and poor-quality CT images.

CT studies of the spine were performed on a spiral CT scanner (Toshiba Aquilion 64, Japan) with a slice thickness of 1 mm. The obtained data were saved in DICOM format.

Vertebral segmentation was performed using a specialized medical CAD/CAM system. The process included the following steps:

1. Data import: DICOM files with CT images were imported into the software.
2. Visualization: Images were visualized in different planes to define the region of interest and assess image quality.
3. Artifact correction: Tools were applied to reduce the influence of metallic artifacts (noise reduction algorithms, filtering).
4. Segmentation: Vertebrae were segmented manually or using semi-automated tools. The boundaries of each vertebra were manually defined on a series of axial slices, and then the software created a 3D model of the spine.
5. Quality assessment: The quality of segmentation and the presence of artifacts on the 3D model were visually assessed.

Descriptive statistics methods were used to analyze the data. The following parameters were estimated:

- Time taken for segmentation: The average time required to segment one vertebra.
- Localization and number of artifacts: Number of vertebrae where shadow areas or surface distortions were observed.
- Type of metal: Classification of structures by type (rods, screws, plates).
- Individual Features: Assessment of individual anatomical features of the spine.

Results and discussion

Analysis of CT scans revealed several key features regarding the effect of metal on spinal segmentation:

- Time taken for segmentation: The average time required to segment one vertebra without a metal in place was 1.3 minutes, while the average time required to segment a vertebra with a metal was 7.4 minutes.
- Localization and number of artifacts: The greatest difficulties were encountered when segmenting vertebrae with implanted transpedicular screws. Shadow areas and surface distortions were most pronounced in the area of the screw head, making it difficult to determine the boundaries of dorsal vertebral structures and assess their shape.
- Metal type: Different types of metal structures (rods, screws, plates) produced artifacts of varying intensities and shapes. For example, screws, which have a smaller surface area, caused more localized distortion than plates.
- Individual characteristics : Anatomical features of the patients, such as the magnitude of spinal deformity, the degree of vertebral rotation, and the presence of a bone block that alters the physiologic topography of the dorsal structures, also influenced the complexity of segmentation.

The impact of artifacts on the accuracy of 3D spine models may have clinical implications:

- Surgery planning: Inaccurate models can lead to errors in the assessment of bone fusion and bone block formation, possibly over-imaging or lack of bone block on the 3D model in contrast to the real anatomy.
- Navigation during operation: Using inaccurate models for navigation can increase the risk of generating an incorrect path for reference entry.

Conclusions

Segmentation of the spine in children with metal structures presents significant challenges. To improve the accuracy of 3D models, the development of specialized segmentation methods that take into account:

- Type of metal.
- The nature of the primary surgery and individual anatomical features.
- Application of artifact correction algorithms.

Further research

Improving the accuracy of spinal segmentation in children with metal requires a comprehensive approach:

- Artifact Correction Algorithms: Development and improvement of algorithms to reduce the effects of shadow regions and surface distortions in images [2].

- Artificial intelligence-based segmentation: Training neural networks on large amounts of data with different types of artifacts for automatic vertebral segmentation [3].
- Multimodal imaging: The use of additional imaging modalities, such as Radiography, to provide additional information about spinal structure and compensate for the shortcomings of CT scans [1].
- Individualized approach: Development of segmentation methods that take into account the type of metal and individual anatomical features of the patient.
- Assessment of the clinical relevance: Conducting clinical studies to determine the impact of 3D model accuracy on surgical outcomes.

Prospects

The development of artificial intelligence technologies and image processing methods opens up new opportunities for solving the problem of spinal segmentation in children with metal structures. With the help of specialized algorithms and an individual approach, the accuracy of 3D models can be improved, leading to better planning of operations, increased safety and efficiency of surgical treatment, and improved quality of life for patients.

Source of financing: the study was carried out within the framework of state assignment No. 056-00043-24-00

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考虑年龄和性别,对病虫害影响下蜂群动态进行概念建模
**CONCEPTUAL MODELING OF THE DYNAMICS OF BEE
COLONIES UNDER THE INFLUENCE OF DISEASES AND PESTS,
TAKING INTO ACCOUNT AGE AND SEX**

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抽象的。疾病和害虫影响下蜂群动态的年龄和性别特异性概念模型是一项旨在了解疾病和害虫等各种因素如何影响蜂群行为和活动的研究。这项研究特别关注蜂群的年龄和性别特征,因为它们可以显著影响其对外部影响的反应。摘要涵盖了用于分析这些关系并预测蜂群面对疾病和害虫攻击时的行为的概念模型。这些发现将有助于扩大我们对蜜蜂群落动态的了解,并制定有效的策略来管理和保护蜜蜂免受健康威胁。

关键词: 蜜蜂家族, 性特征, 生命阶段, 传染病的影响, 害虫宏观生物的影响, 非线性常微分方程组。

Abstract. *Age- and sex-specific conceptual modeling of bee colony dynamics under the influence of disease and pests is a study aimed at understanding how various factors, such as disease and pests, influence bee colony behavior and activity. This study pays special attention to the age and sex characteristics of a bee colony, as they can significantly influence its response to external influences. The abstract covers conceptual models that are used to analyze these relationships and predict the behavior of bee colonies in the face of disease and pest attacks. The findings will help expand our understanding of the dynamics of bee communities and develop effective strategies for managing and protecting bees from health threats.*

Keywords: *honey bee family, sexual characteristics, life stage, influence of infectious diseases, influence of pest macroorganisms, system of nonlinear ordinary differential equations.*

In previous studies, we have extensively studied the life and activities of individuals in a bee colony and formalized the symbolic representation of these processes in the form of conceptual, mathematical and computer models. In these

works, we paid more attention to a generalized representation of the life stages of individuals in a bee family and their classification by age and gender [4, 5, 8-12]. However, research in the field of biology shows that during the formation of age stages of individuals in a bee colony, there may be objective factors that negatively affect the normal course of these processes [1, 4, 9, 10-12].

Materials and Methods

Conceptual modeling. In the research works [8-12], we introduced the concept of conceptual modeling to describe the life stages of individuals of the bee family without taking into account sexual characteristics [11] and taking into account these characteristics [4, 8-12]. During the development of these models and their corresponding mathematical models [8-12], we used a set of notations that we will use here. For example, with the help of the variable $B_z(t), t \in [t_0; t_n], n \in N$ the total effect of infectious diseases of the bee family population and with the help of $b_{ij} (i = 1, 2; j = 1, 2, 3, 4, 5)$ respectively, the mortality rates of individuals of each life stage of the family due to the effects of these diseases are indicated, where i is the indicator of the bee's gender (1 – female, worker bee; 2 – male, drone bee) and j - the number of its life stage.

In this context, the total amount of pest rodents is indicated by the variable $H_{oz}(t), t \in [t_0; t_n], n \in N$, and the shares (coefficients) of the loss of the bee family due to rodents for each stage of the family's life with the help of $(i = 1, 2; j = 1, 2, 3, 4, 5)$ are indicated.

The total number of reptiles and insect pests is indicated by the variable $H_{az}(t), t \in [t_0; t_n], n \in N$, the mortality coefficients of both sexes of adult bees of the family during their consumption by these pests are indicated by c_1 and c_2 . Also, by the variable $P_z(t), t \in [t_0; t_n], n \in N$ the total number of pest birds, by p_1 and p_2 the corresponding mortality coefficients of both sexes of bees during their consumption by these birds are indicated [4, 8-12].

Thus, as in the previous signaling system, with the help of $E_m(t)$, the total number of eggs laid by the mother bee in one day is indicated, and the state of transition of the individuals of the bee family from one life stage to another at a given time $t \in [t_0; t_n], n \in N$ are described with the help of the following 10 variables: $E_1(t)$ – number of eggs from which worker bees (queens) are born, $E_2(t)$ – number of eggs from which bees are born, $K_1(t)$ – number of worker bee larvae, $K_2(t)$ – the number of honey bee larvae, $P_1(t)$ – the number of pre-molting individuals of the worker bee, $P_2(t)$ – the number of pre-molting individuals of the honey bee, $Z_1(t)$ – the number of worker bees, $Z_2(t)$ – the number of honey bees, $M_1(t)$ – number of working adult bees and $M_2(t)$ – number of adult bees [4, 8-12].

Exactly, according to this system [9, 12], with the help of $\mu_{ij} (i = 1, 2; j = 1, 2, 3, 4, 5)$ - the natural mortality rate of individuals of the i -th sex group of the population of the bee family at the j -th stage of their life and with the help of

δ_{ij} ($i = 1,2; j = 1,2,3,4,5$) - share (coefficient) of their transition from one stage of life to another [4, 8-12].

Taking into account the logic of the above reasoning, we created a conceptual model of a bee colony population exposed to infectious diseases and pests. This model is presented in the form of a diagram shown in Figure 1. It illustrates the negative impact of these external factors on the activity of individuals in a bee colony and their transition from one life stage to another.

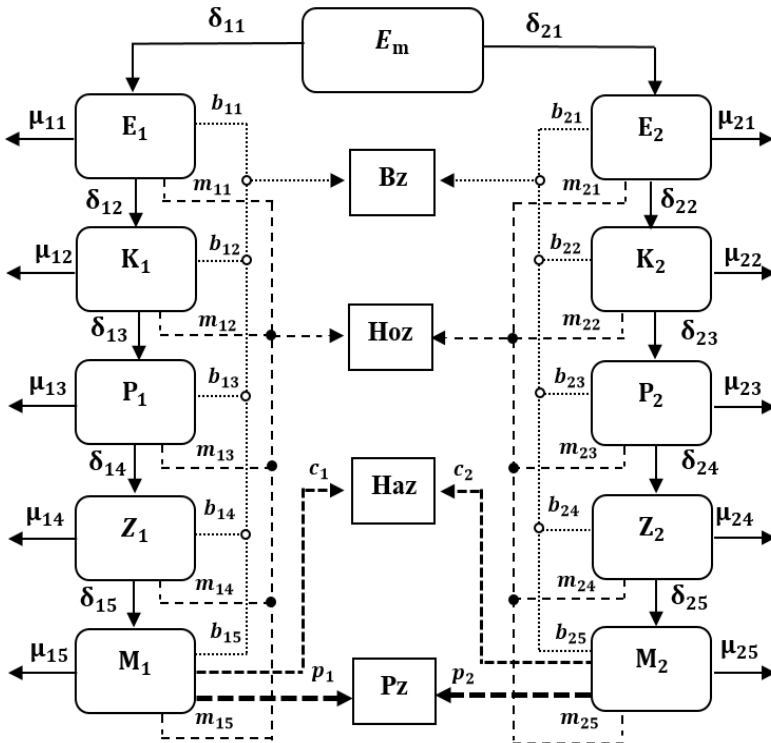


Figure 1. Conceptual model of the life stages of a honey bee family under the influence of diseases and pests

Conclusions

In conclusion, I would like to emphasize the importance of research conducted in the field of modeling the dynamics of bee colonies under the influence of diseases and pests, taking into account their age and gender characteristics. The results obtained and the conceptual models developed represent a valuable contribution

to the understanding of how external factors influence the behavior and viability of bee colonies. These results may provide the basis for the development of effective strategies to manage and protect bees from threats to their health. Further research in this area could help better understand the dynamics of bee communities and how they can survive in a changing environment.

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创建农村智能电网及其并入俄罗斯集中式电网的问题
**THE PROBLEMS OF CREATING RURAL SMART GRIDS AND
THEIR INTEGRATION INTO A CENTRALIZED ELECTRIC GRID
IN RUSSIA**

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抽象的。 本文讨论了在农村地区部署新型电力基础设施（智能农村电网），以提高终端消费者能源供应的可靠性。

分析了使用 HOMER 建模和优化包确定最佳规模、可再生能源参与的发电构成以及优化创建农村智能电网的成本的问题，以及实际管理创建的微电网的问题 时间并使用集成控制系统将其集成到集中式网络中。

考虑利用智能农村电网实现俄罗斯农业生产智能化、保障可靠能源供应、农业现代化和农村经济发展的任务。

关键词：农村智能电网、微电网、配电网、可再生能源、分布式发电。

Abstract. *The article discusses the deployment of new electrical power infrastructure in rural areas (Smart Rural Grid) to improve the reliability of energy supply to end consumers.*

The issues of determining the optimal size, composition of generation with the participation of renewable energy sources and optimization of costs for creating a Rural Smart Grid using the HOMER modeling and optimization package are analyzed, as well as the problems of managing the created microgrid in real time and its integration into a centralized network using an integrated control system.

The tasks of using Smart Rural Grid in the intellectualization of agricultural production in Russia, ensuring reliable energy supply, modernization of agriculture and economic development of rural areas are considered.

Keywords: *Rural Smart Grid, microgrids, distribution networks, renewable energy sources, distributed generation.*

1. Introduction

All over the world, the production of electricity from renewable sources is rapidly increasing and their share currently accounts for more than half of the

increase in global electricity generation, while the current stage of development of the electric power industry is characterized by the large-scale use of renewable sources of electricity directly to the end consumer, as well as the development of new energy and information and communication technologies that make it possible to effectively manage the existing smart energy system [1].

Constantly rising electricity prices and deteriorating distribution networks highlight the benefits of producing energy close to the point of use and increasing the energy efficiency of consumer equipment.

The creation of a smart network that unites a growing array of distributed energy resources located at end consumers, including various options for generating and storing electricity, helps balance supply and demand, ensures the reliability of energy supply to the consumer, and also opens up access to new products, services and markets.

The International Energy Agency's (IEA) Roadmap defines a Smart Grid as an electricity network that uses digital and other advanced technologies to monitor and manage electricity generation from all sources to meet the changing needs of end users in order to achieve maximum operational efficiency. All parts of the system, minimizing costs and environmental impact while maximizing system reliability and efficiency [2].

Smart grids are an evolving set of local generation and technologies that are being deployed at different rates and in different contexts around the world, depending on local commercial attractiveness, compatibility with existing technologies, regulatory changes and the investment base.

Properly designed and effectively managed smart grids provide consumers with the opportunity to make optimal behavior and purchasing choices in the retail electricity market. Smart grid deployment and smart grid costs and savings must be tailored to the specific needs of each region, taking into account market and regulatory considerations.

Smart grids have a particularly large role to play in the deployment of new rural electricity infrastructure (Smart Rural Grid), enabling more efficient operation and lower costs for consumers in remote areas.

2. Determining the size, generation mix and costs for creating a Rural Smart Grid

One of the prerequisites for creating a Rural Smart Grid is to study the load profile of the system for forecasting and data management to meet the power demands of diverse loads by matching supply and demand and effectively reduce peak loads through intelligent load management through the installation of smart meters. Peak load management will reduce the need for operational generation reserves to ensure a reliable source of energy supply [3].

A variety of local renewable and traditional energy sources can work together in a smart grid, creating hybrid generation with different principles and modes of

operation of the generating devices. Renewable energy sources due to their intermittent nature cannot supply the load continuously and the load itself is constantly changing as required, so additional battery storage is required to ensure a continuous balance of generation and load. The correct choice of combination and power of generating devices with an electricity storage system and with a consistent load profile significantly affects the costs of the local network [4].

Extremely important when building a Rural Smart Grid is the sizing of generating units and cost analysis for stand-alone hybrid systems. To design an autonomous power plant and optimize the installed capacity of renewable energy sources, it is necessary to model the system configuration depending on natural conditions and the nature of the load.

Abroad, the selection of the best option for identifying available energy resources in a certain local area, depending on the nature of the load and its potential demand, at many sites around the world, a modeling and optimization process is used using the Hybrid Optimization Model for Electric Renewable (HOMER) software package for simulation Rural Smart Grid model based on optimization of initial capital costs, power generation costs, operation and maintenance costs and life cycle cost (LCC) analysis of the facility [5].

For example, in rural Bangladesh, the HOMER package was used to analyze the potential of wind and solar energy by investigating the economic feasibility of a grid-connected hybrid power system. Two types of models have been developed and optimized for comparison: standalone and networked. For each model, a sensitivity analysis was performed to determine the impact of variations in grid energy costs on the overall grid cost. The simulation results show that the grid-connected hybrid power system is the most suitable and cost competitive for the specified region [6].

The combination of various power plants using RES is considered an effective and promising approach to electricity generation for rural electrification. Using the HOMER package, Rural Smart Grid hybrids with various generation sources were selected and built in Indonesia, India, Ethiopia, Algeria and other developing countries [7-9].

3. Problems of microgrid management and its integration into the network

There are a number of active microgrid projects and research efforts around the world testing and evaluating these advanced power distribution system concepts: American microgrids, Asian microgrids, European microgrids [10], [11].

However, there is rather little literature on rural smart grids and improving the reliability of energy supply to rural consumers through the introduction of modern technologies. The main difference between urban and rural microgrids is that rural areas are connected to weak distribution networks. Radial networks are the most obvious choice for creating microgrid systems in rural areas.

One of the important aspects of the construction of microgrids is that their operation does not contradict the use of a traditional power supply system, complements the electrical grid system, increases the reliability of power supply to the end consumer, especially in the event of technological or emergency outages in the distribution network, while the microgrid can be turned off if emergencies in the network without affecting the local power supply.

Ensuring reliable power supply to self-loads is the most important priority for microgrids. Therefore, a microgrid must have the following characteristics, which must be ensured when connected to the distribution network [12]:

- Installed at a specific local location, which can be either in the distribution network itself or in a remote area connected to the radial distribution network.
- Must have two operating modes: connected to the network; and autonomous (isolated) and for this purpose have devices in the distribution network for automatically connecting and disconnecting the electrical network, and must be provided with appropriate means and protection circuits.
- Provided with an intelligent bidirectional electricity metering system for mutual settlements when receiving electricity from the network and in the event of supplying excess microsystem generation power to the centralized network.
- Generate the required reference voltage and frequency in islanded mode to support the highest priority loads during a power outage or poor power quality.
- To use local information to manage energy consumption and stochastic generation to ensure power balance in the microgrid including abnormal situations (unintentional network outages or faults).
- To act as a single controllable entity from the grid's perspective, using monitors to monitor electrical components such as power, voltage and frequency.

One of the main reasons for the development of the microgrid concept is the penetration of renewable energy sources, which have been recognized as a major driver for the introduction of these types of power units into the microgeneration structure. These types of resources are completely dependent on weather conditions, and their erratic and highly variable nature can lead to significant uncertainty regarding the generation and load balance that is critical to microgrid operation.

The basic single-line diagram of a smart grid is shown in Fig. 1.

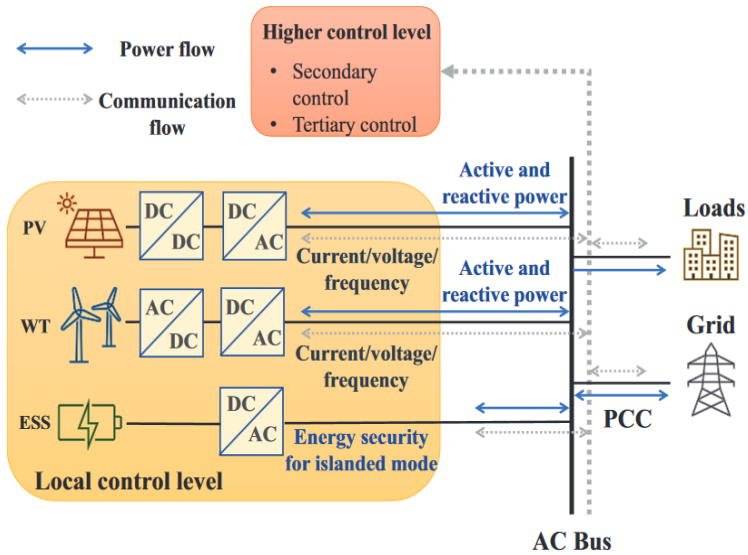


Figure 1. Schematic single-line diagram of a smart grid [12].

RES technologies generate uncontrolled power with different voltages and frequencies. The use of RES generation units as a power source can undoubtedly cause many disadvantages, such as problems with control, dynamics and energy management. Therefore, it is very important to ensure a balance of supply and demand, which must be ensured at any given time.

To ensure coordinated, integrated and efficient operation of the microsystem in any mode, it must be provided with a monitoring and control system that plays a vital role in the reliability of power supply to the end user, while, thanks to the common connection point, it is possible to operate in both isolated mode and in grid-connected mode, which should provide increased flexibility in managing microgeneration in different operating modes.

In cases where local resources are insufficient, grid connection is used to meet end-user needs and supply-demand imbalances may result and should be avoided. This flexibility also addresses voltage and frequency stability issues.

Microgrids are power distribution systems containing controllable loads and distributed energy resources (such as traditional micro, mini and renewable generators, power electronic converters, electrical storage devices and static load switches) that can and should be controlled in a coordinated manner either when connected to the main power grid or in island mode.

One of the most important challenges in managing smart grids in rural areas is the diversity and poor predictability of load and generation characteristics of RES. To cope with this problem and ensure load balance to maintain the required voltage and frequency, the control system must have a hierarchical structure, shown in Fig. 2 [13].

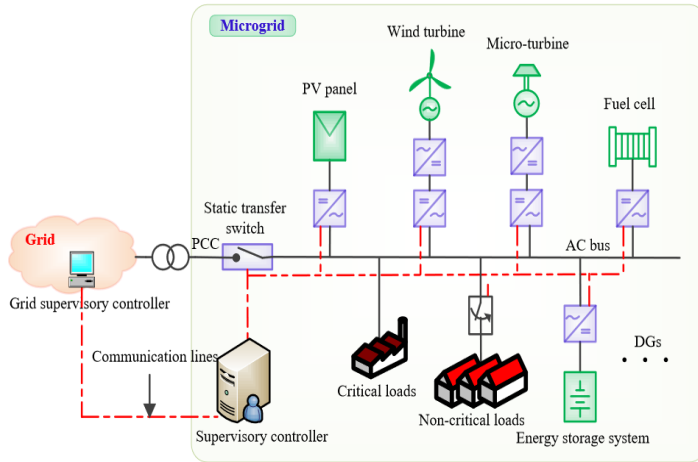


Figure 2. Hierarchical management system of smart rural grid [13]

A microgrid is different from a distribution network and has both additional benefits and challenges, with the main difference being the application of an energy management system in the form of a centralized control unit, which as the main controller is used to maintain optimal operation of the microgrid. However, if connected to a network, it is subject to additional requirements for overload protection and synchronization with a centralized network.

When considering these operational issues, master controllers will need to continually maintain a balance of active and reactive power, as well as ensure optimal allocation of local resources through control, automation and communications systems. The microgrid central controller is a physical computer system consisting of a software platform that uses various modules for load generation and forecasting, human-machine interfaces, and supervisory control and data acquisition (SCADA).

It has been noticed that systems with a high level of distribution of distributed generation experience changes in voltage and reactive power, as well as frequency fluctuations at the connection point. Therefore, the main task of networks, guar-

anteing their local reliability and stability of consumers, is voltage regulation, for which a local voltage regulation system should be developed to avoid these changes and the circulation of reactive currents between sources [14].

The central controller performs multiple processes to forecast power production, power demand and market prices for power, as well as monitoring, analyzing and optimizing data to provide the functions required for efficient operation of the power system by sending optimal solutions to ensure power supply at minimum cost. A central controller is required to systematically coordinate the various components of a microgrid to ensure its energy-efficient, safe, reliable and cost-effective operation, and can be implemented for both centralized and decentralized information processing.

In centralized processing, the central controller processes all microgrid information, while in decentralized control, the central controller only takes into account a limited amount of real-time information from local controllers, which must provide the primary level of control designed to ensure proper power distribution among microgeneration units and load voltage control.

When distributed generation is integrated into the distribution network, its operation changes significantly as the flow of electricity becomes bidirectional. Distributed generators are impacting feeder operations and the planning and safety practices of electric utilities. From a power supply security perspective, microgrids must include settings for protection devices and ways to restore the system in the event of a fault.

Since the control approach is a key element of the microgrid, it must be designed to represent the microgrid as a whole from a power system perspective. A good place to provide control and protection systems for microgrids is the power substation.

The affected rural consumer is usually connected to an extended distribution network, which, through a final transformer and circuit breaker, supplies the load of the rural consumer at a low voltage level. Radial networks are based on a single main line, where loads and distributed generation are connected in parallel. When the term “smart grid” is used, it refers to the entire network as a whole: the electrical system, including a variety of generation, taking into account renewable energy sources; transmission and distribution of electricity; various productions of agricultural consumers with varied loads, including social institutions and the population; retail electricity market and energy service providers, as well as operation. All this makes the network a rather complex object to manage [15].

4. Development of electricity infrastructure in rural areas in Russia

The development of electrical power infrastructure in rural areas in Russia should lead to increased energy efficiency and a reduction in the cost of production of agricultural products at agro-industrial complex enterprises, the creation of

smart agricultural enterprises, and improved quality of life and working conditions for rural residents. The energy intensity of agricultural production can be reduced through the introduction and use of renewable energy sources (RES), obtaining energy from secondary energy resources and waste from livestock and agricultural activities, and the creation of smart energy supply systems in rural areas [16].

The creation of smart agricultural enterprises with a complex of interconnected smart fields, farms, greenhouses and auxiliary production, based on modern competitive domestic technologies and management systems with the introduction of information and communication technologies (ICT), intelligent metering of energy resources, planning and forecasting of a systematic reduction in energy intensity should ensure efficient production agricultural products [17].

The use of renewable energy sources has already become the norm almost throughout the world. The emerging economic basis for the widespread use of renewable energy sources makes it possible to build a new energy sector with lower specific investments per 1 kW of installed capacity and with the production of cheaper electrical energy than from a centralized power grid. RES power plants provide the highest net return on invested capital, the highest profitability index and the highest return on investment [18].

A person is not able to cope with a large flow of stochastic information received from various sources (tags, controllers, sensors, controls), which must be quickly processed, make the right decisions and at the same time manage the production process. Therefore, to significantly increase the efficiency of agriculture in Russia, it is necessary to digitalize all agriculture, which should provide the opportunity to use broadband, mobile, LPWAN communications, information technologies (small and big data, AI, management platforms), and in every possible way develop the market for information technologies and end-to-end digital systems in agriculture, leveling the digital divide between urban and rural areas [19].

The insufficient development of digital infrastructure in rural areas, especially in rural areas, does not currently allow us to achieve the full potential of introducing modern energy technologies.

This requires new tools, more flexible approaches and mechanisms to ensure adequate capacity in smart rural electricity grids, taking into account the rapid development of digital technologies, control platforms, ICT and power control equipment. Electricity generators must be more responsive, consumers must be more connected and adaptable, and grid infrastructure must be strengthened and digitized.

Rural power grid is one of the key infrastructures in rural areas, which affects the level of agricultural production, farmers' working conditions and the well-being of rural residents, so the smart rural power grid becomes an important foundation and driving force of a new rural regional development model.

The required distributed generation resources and power equipment can be flexibly integrated and intelligently distributed using advanced information, communication and control technologies. Local consumption of clean energy can help improve greenhouses, pumped irrigation systems and heating systems.

Systems for monitoring and forecasting weather conditions will make it possible not only to effectively manage local generation sources with the participation of renewable energy sources, but also to regulate the load in accordance with changes in the process of agricultural production itself depending on the weather. Information about agricultural production can be collected in the form of a panorama and subjected to intelligent monitoring.

The application of power grids in smart agricultural production can ensure reliable energy supply, improve the overall information level in rural areas, promote the modernization of agricultural production structure and the economic development of rural areas.

The application of smart grids in rural areas in Russia optimizes crop growing conditions, reduces production costs, reduces labor and improves efficiency. All this contributes to further economic development and intellectual construction of agricultural production [20].

5. Conclusion

Rural power grids are one of the most important infrastructures in rural areas. The level of agricultural production, working conditions and well-being of rural residents significantly depend on a reliable energy supply to the village.

It is necessary in every possible way to develop and introduce modern distributed generation technologies with the participation of renewable energy sources and advanced information and communication technologies in the rural energy sector. The introduction of new technologies and intelligent management of the rural power grid Rural Smart Grid is becoming an important basis and driving force for a new rural model of regional development.

Therefore, great attention should be paid to and carefully studied the development of the process of implementation and operation of Rural Smart Grid abroad in order to make the most of this experience in rural electrical networks in Russia.

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磁路对直流电机动态延迟和调节质量的影响

THE INFLUENCE OF A MAGNETIC CIRCUIT ON THE DYNAMIC DELAY AND THE QUALITY OF REGULATION OF A DC ELECTRIC DRIVE

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抽象的。 本文研究了磁路对直流电驱动器的动态延迟和控制质量的影响。在石油和天然气行业中，提高生产过程的效率和可靠性的需要证明了开发电驱动控制系统的重要性。 该工作表明，动态延迟对控制质量和瞬态过程的特性有着显著影响。 强调需要进行理论研究，包括使用布洛赫方程，以更深入地了解磁路影响动态延迟的机制。

关键词: 布洛赫方程、动态延迟、直流电驱动、Matlab/Simulink。

Abstract. *The article examines the influence of a magnetic circuit on the dynamic delay and control quality of a DC electric drive. In the context of the oil and gas industry, the relevance of the development of electric drive control systems is justified by the need to improve the efficiency and reliability of production processes. The work reveals that dynamic delay has a significant impact on the quality of control and the characteristics of transient processes. The need for theoretical studies, including the use of Bloch equations, is emphasized to gain a deeper understanding of the mechanisms by which a magnetic circuit influences dynamic delay.*

Keywords: *Bloch equations, dynamic delay, DC electric drive, Matlab/Simulink.*

The development of electric drive control systems in the oil and gas industry is of great importance in the modern context for several key reasons.

Firstly, energy efficiency is one of the main aspects that highlight the relevance of this area. Electric drive control systems help optimize equipment energy consumption, which is especially important in an industry where energy costs can be

enormous. This helps not only reduce operating costs, but also reduce the negative impact on the environment by reducing carbon emissions and other harmful substances.

Secondly, electric drive control systems provide increased accuracy and reliability of equipment operation. In the oil and gas industry, any failure or malfunction can have serious consequences, including accidents and loss of production. Modern control systems provide monitoring and diagnostics of equipment condition, which helps prevent failures and minimize downtime.

Third, flexibility and adaptability of electric drive control systems play an important role in a changing work environment. In the oil and gas industry, changes in operating conditions such as changes in load, speed or temperature are common. Modern control systems are able to quickly adapt to such changes, ensuring stable and efficient operation of equipment.

In addition, the development of electric drive control systems also contributes to the improvement of production processes in general. Optimizing electric drive control allows you to increase productivity, reduce time and material costs for production, and also improve the quality of products.

Dynamic latency plays a key role in the control of electric drives, arising from various reasons: inertia of mechanical components, response time of control devices and delays in data transmission. The impact of this delay on control quality is especially important in the oil and gas industry, where high accuracy and responsiveness of systems are required. Large delays can reduce equipment performance and increase the risk of accidents. For example, in electric drive control systems for pumps or compressors, a delay can lead to process instability or even equipment damage. In pipeline valve control systems, unaccounted for dynamic delays lead to a decrease in the accuracy of regulation of gas and oil pumping process parameters.

Various techniques are used to reduce the impact of dynamic latency on control quality, including:

- To use of advanced control algorithms that take into account the dynamic characteristics of the system and compensate for delays.
- Improved system mechanical components to reduce inertia and response time.
- Optimization of data processing and transmission to reduce communication delays.
- Use of high-precision feedback sensors to improve control accuracy.

Overall, understanding and managing dynamic latency is a key aspect in developing efficient and reliable electric drive control systems in the oil and gas industry.

There may also be delays in the magnetic circuit, which can affect the quality of system control. The magnetic circuit includes magnetic components such as

magnets, cores, windings, etc., which play a key role in creating the magnetic field necessary for the operation of the electric drive. [2, pp. 106-136]

Delays in the magnetic circuit can be caused by several factors:

1. Magnetic inertia: The processes of magnetization and demagnetization of magnetic materials require a certain time due to their inertia. This can lead to delays in the change in the magnetic field and therefore in the system's response.

2. Electromagnetic time: The time required for electromagnetic waves to propagate through winding or core materials can also cause delays in the system.

3. Electromagnetic effects: For example, induction and scattering effects can lead to energy buildup and delays in the change of magnetic field.

Although the magnetic circuit typically has a much faster response time than the mechanical components of the system, even small delays can have a significant impact on control quality, especially where precision and speed requirements are high.

The disadvantage of not taking into account the dynamic delay caused by the magnetic circuit can manifest itself as follows:

1. Deterioration of control accuracy: Delays in the magnetic circuit can lead to a shift in the timing characteristics of the system and a decrease in control accuracy. For example, when positioning a motor, this can lead to inaccuracies in position.

2. System instability: Long delays can cause control system instability, which can result in oscillation or overshoot. This is especially critical when working with dynamic loads.

3. Reduced Response: Delays in the magnetic circuit can reduce the response of the control system, which is especially important in cases where rapid response to changes in external conditions or control commands is required.

Taking into account the dynamic delay caused by the magnetic circuit during the design and configuration of the electric drive control system can minimize its impact and ensure higher performance and reliability of the system. This may include optimizing the magnetic circuit design, selecting materials with minimal magnetic inertia, and using advanced control algorithms that take into account the dynamic characteristics of the system.

Theoretical studies of the problem of magnetic delay in electric drive control systems represent an important step in the development of efficient and reliable systems. They allow us to understand the physical processes underlying the occurrence of delays in a magnetic circuit, such as magnetic inertia, electromagnetic time and other factors. This understanding helps to assess the impact of delays on the quality of system control, identify critical areas for further research and develop methods to compensate for them. Theoretical models can also be used to optimize the design of magnetic systems, selecting optimal materials and component

geometries, which ultimately helps improve the performance and reliability of the electric drive control system. Such research can also serve as a basis for practical experimentation and testing, accelerating the development of new technologies and management methods.

The theoretical basis for studying dynamic delays in a magnetic circuit can be the work of Felix Bloch.

The Bloch equations are a system of differential equations used in the theory of magnetic resonances and related to the magnetic moment of atoms or nuclei in a magnetic field. Although they have applications in atomic and molecular physics, they can also be used to analyze magnetic systems more generally, including magnetic circuits in electric drive control systems.

In general, the Bloch equations can be written as follows:

$$\begin{aligned}\frac{dM_x}{dt} &= \gamma(M_y B_z - M_z B_y) - \frac{M_x}{T_2}; \\ \frac{dM_y}{dt} &= \gamma(M_z B_x - M_x B_z) - \frac{M_y}{T_2}; \\ \frac{dM_z}{dt} &= \gamma(M_x B_y - M_y B_x) - \frac{M_z - M_0}{T_1}\end{aligned}$$

where M_x, M_y, M_z - magnetic moment components, B_x, B_y, B_z - magnetic field components, γ - gyromagnetic ratio, T_1 и T_2 - transverse and longitudinal relaxation times, respectively, M_0 is the equilibrium magnetic moment.

To analyze delays in the magnetic circuit in electric drive control systems, the Bloch equations can be modified and adapted to take into account the specific features of the magnetic system and external influences. For example, you can include additional terms in the equations that describe dynamic delay effects, such as the inertia of magnetic materials or the timing of windings. Such modifications make it possible to more accurately describe the behavior of the magnetic system and its influence on the dynamics of electric drive control. Also, by changing the parameters of the Bloch equations, such as the relaxation times T_1 and T_2 , we can optimize the timing characteristics of the control system. This allows you to find the optimal values of these parameters to minimize the impact of delays on system performance.

Using the Bloch equations will allow us to conduct a more specific analysis of the effect of delays in the magnetic circuit on the performance and reliability of the electric drive control system. This will provide more accurate conclusions and practical recommendations for improving system performance.

Let us consider the solution of the Bloch equations for free time intervals. To do this, let's move to a new coordinate system with axes x', y', z' , rotating around an axis \mathbf{e}_z with frequency ω_0 in the direction of field rotation.

We can represent the Bloch equations in a rotating coordinate system:

$$\begin{aligned} \frac{dM_{x'}}{dt} &= \Omega M_{y'} - R_{y'}(t)M_z - \frac{M_{x'}}{T_2}; \\ \frac{dM_{y'}}{dt} &= -\Omega M_{x'} + R_{x'}(t)M_z - \frac{M_{y'}}{T_2}; \\ \frac{dM_z}{dt} &= R_{y'}(t)M_{x'} - R_{x'}(t)M_{y'} + \frac{M_0 - M_z}{T_1}, \end{aligned}$$

where $\Omega = \gamma B_z - \omega_0 = \omega - \omega_0$, $\dot{R}_{x',y'}(t) = \gamma B_{x',y'}(t)$.

The solution of the Bloch equations for free time intervals can be presented in matrix form.[1]

$$\begin{aligned} \mathbf{M}(t, \Omega) &= \mathbf{B}(t, t_0, \Omega)\mathbf{M}(t_0, \Omega) + \mathbf{B}_H(t, t_0), \\ \mathbf{B}(t, t_0, \Omega) &= \begin{bmatrix} \exp[(i\Omega - 1/T_2)(t - t_0)] & 0 & 0 \\ 0 & \exp[-(i\Omega + 1/T_2)(t - t_0)] & 0 \\ 0 & 0 & \exp[-(t - t_0)/T_1] \end{bmatrix}, \\ \mathbf{M} &= \begin{bmatrix} \tilde{M} \\ \tilde{M}^* \\ M_z \end{bmatrix}; \quad \mathbf{B}_H(t, t_0) = \begin{bmatrix} 0 \\ 0 \\ M_0 \{1 - \exp[-(t - t_0)/T_1]\} \end{bmatrix}. \end{aligned}$$

It follows from this that the transverse components perform a circular motion around the longitudinal axis and simultaneously decrease in amplitude according to the exponential law

$$\tilde{M}(t, \Omega) = \exp[(i\Omega - 1/T_2)(t - t_0)]\tilde{M}(t_0, \Omega).$$

The longitudinal component of the magnetization vector tends to an equilibrium value (Fig. 1).

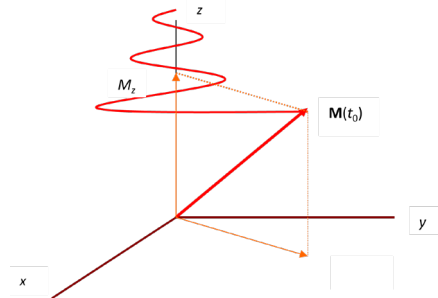


Figure 1. Evolution of the magnetization vector

Let us consider the influence of the dynamics of magnetic circuits on the quality indicators of the control process using the example of a system of subordinate control by a direct current electric drive. To demonstrate this experiment, we will use the Matlab Simulink software package. Figure 2 shows the speed loop model, and Figure 3 shows the DFC (slave control loop) model.

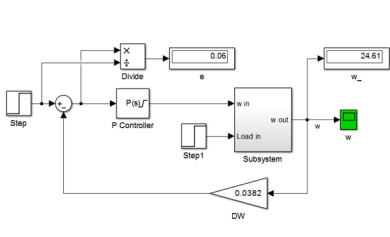


Figure 2. Model for speed loop

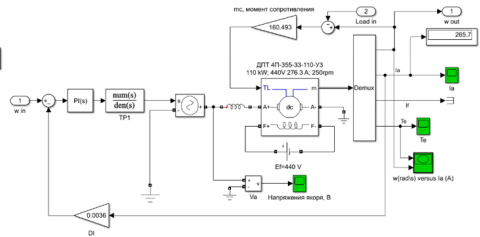


Figure 3. DCM model

This model has a speed loop through the armature circuit control channel with a P-regulator and a slave DC motor loop with a PI armature current controller. We will evaluate the influence of the armature magnetic circuit on transient processes using the example of modeling various operating modes of a DC motor. The inductor in the armature circuit will act as a magnetic circuit. Let's carry out the following experiment:

1. Let's start the engine and reach the rated speed;
2. At a time of 15 seconds, set the speed to 0.9 pu;
3. At 20 seconds we will reset the load.

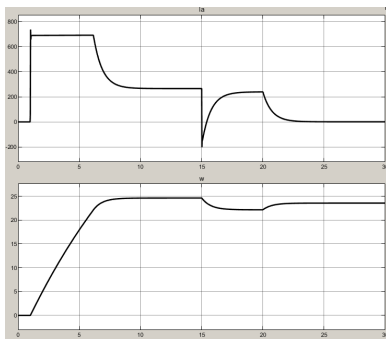


Figure 4. Graphs of current and speed in nominal mode

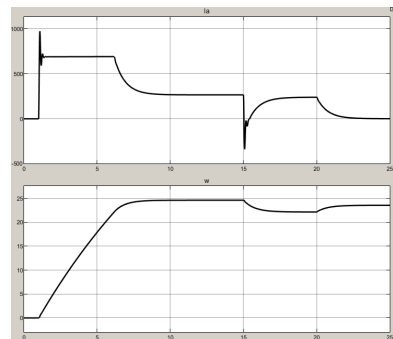


Figure 5. Graphs of current and speed with increasing inductance of the armature circuit

These graphs show that the magnetic circuit represented by the inductor in the rotor circuit affects the transient processes of the motor. In particular, over-regulation when starting the engine, when the rotation speed changes, increases, unreasonable current surges appear, which negatively affect the condition of the engine and to avoid these consequences it is necessary to reconfigure the current circuit in order to achieve an adequate transient process.

Reconfiguring the PI current controller in this software package is possible using the PID Tuner App function. The operating characteristics of the motor with the new parameters of the PI controller are presented in Figure 6.

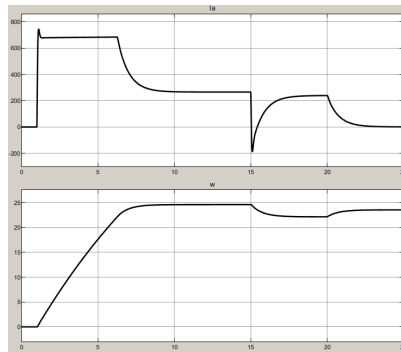


Figure 6. *Graphs of current and speed when reconfiguring the current regulator*

The resulting graphs in Figure 6 show that transient processes are obtained with a small overshoot, without sudden current surges with an acceptable regulation time.

This experience shows that the magnetic circuit influences control processes and transient processes. Changes in inductance in motor circuits require close attention and monitoring of changes in operation. Changes in the parameters of the magnetic circuit are weakly expressed in the mechanical part, but have the greatest impact on the electrical part and the control system. Algorithms for monitoring deviations of parameters from the specified ones and their automatic reconfiguration are required.

In this article, the influence of the magnetic circuit on the dynamic delay and control quality of a DC electric drive was investigated. Bloch's equations for modeling the dynamic behavior of magnetic systems showed that the magnetization vector has a longitudinal and transverse component. It was noted that the magnetic circuit significantly influences the control processes and the quality of transient processes. The results obtained can be used for further work on studying electric drive control systems in order to ensure more accurate and reliable operation under various operating conditions.

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豆粉在鲶鱼碎组合鱼块开发中的应用

**APPLICATION OF BEAN FLOUR FOR THE DEVELOPMENT OF
COMBINED FISH MASSES BASED ON MINCED CATFISH**

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注解。 本文致力于研究扩大基于鲶鱼和豆粉的组合鱼块切碎的半成品的范围。 证实需要对豆粉进行初步浇水, 为此确定足够量的水, 足以形成水模块。 科技改良鱼块配方, 以鲶鱼碎为主料, 辅以不同含水量水份的红豆粉。 结果感官对所提供的肉排样品的评估使我们得出结论, 通过在碎鱼中添加一定量的豆粉可以改善肉排的感官特性。

关键词: Clarium鲶鱼、豆粉、水模块、食谱、肉排。

Annotation. *This article is dedicated to research to expand the range chopped semi-finished products from combined fish masses based on catfish and bean flour. The need for preliminary watering of bean flour is substantiated, for which an adequate amount of water is determined, sufficient for the formation of a hydromodule. Recipes for technologically modified fish masses, in which minced catfish is used as the main component, and red bean flour with a hydromodule of different water content is used as an additional component. Results organoleptic Evaluations of the presented samples of cutlets allowed us to conclude that it is possible to improve the organoleptic characteristics of cutlets by adding bean flour in a certain amount to the minced fish.*

Keywords: *Clarium catfish, bean flour, hydromodule, recipe, cutlets.*

Introduction

One of the most important conditions ensuring the normal functioning of the human body is its balanced, nutritious diet. Numerous studies have found that the increase in socially significant diseases of the country's population is largely explained not only by the lack of vital nutrients in food products, such as macro- and micronutrients, but also by a significant decrease in the quality indicators and biosafety of food products [1]. Based on this, the priority direction for the development of the food industry of the agro-industrial complex of the Russian Federation in modern conditions is the development of new types of products for functional and specialized purposes, including those with unique beneficial properties, which, due to their physical and chemical composition, are able to compensate for the deficiency of essential substances necessary for maintaining human health [2].

One of the promising directions for the production of functional products is the creation of food systems with a targeted composition based on raw materials of animal and plant origin. It is proposed to use fish as a raw material of animal origin, which has high biological value due to its fatty acid, mineral and vitamin composition [3].

Another important aspect of the use of fish-plant semi-finished products is their use for the development of new types of products for functional and specialized purposes, which can be used for nutritional support of people in various conditions of the body.

The feasibility of using plant ingredients in the production of food products based on raw materials of animal origin was scientifically substantiated by the works of hygienists [4, 5]. It was found that the use in diet therapy of multicomponent products based on combined fish masses with herbal supplements, specially developed for children's and adult nutrition, helps to increase the preventive component of the diet without violating physiological norms of consumption and without changing dietary patterns [6]. It has also been established that combined food products introduced into the diet satisfy people's needs for essential amino acids, minerals, vitamins, and fatty acids. At the same time, the combination of plant proteins with proteins of animal origin increases the absorption of the latter and enriches food products with valuable nutrient components of plant additives. As a result, a rational combination of protein of plant and animal origin in food makes it possible to reduce the deficiency of animal raw materials and create products that are balanced in amino acid composition.

The production of these products with certain characteristics is based on the development of recipes and technologies for food compositions of combined fish masses for semi-finished products and culinary products. At the same time, the formation of the specified organoleptic properties and the duration of storage of the finished product largely depends on the type of fish, production method and parameters.

In dietary and therapeutic nutrition, lean and medium-fat fish are mainly used - pollock, cod, blue whiting, hake, pike perch, pike, carp, bream, sea bass, horse mackerel, catfish, etc. This is explained by the peculiarity of the lipid component of fish meat, which, due to its fusibility, is absorbed by the human body better than beef and pork fats, and the biologically active polyunsaturated fatty acids (vitamin F), fat-soluble vitamins A, D, E, fat-like substances (phosphatides, sterols and steroids) contained in it, distinguish it favorably from other types of animal raw materials [6].

Based on this, the search for alternative sources of natural protein systems is an urgent task, and its solution is possible with the practical use of some non-traditional sources of fish raw materials for the Russian Federation [2]. Such a source can be the African (clariid) catfish, the use of which as a raw material for combined fish masses can significantly expand the range of dietary therapeutic and dietary preventive nutrition products. Firstly, clariid catfish, due to their high growth rate, unpretentiousness and ability to breathe atmospheric air, sanitary, epidemiological and environmental safety, are very promising for aquaculture. Secondly, these catfish are distinguished by high nutritional qualities and excellent technological properties. It has been established that the proportion of edible parts (carcasses) of catfish is 66%, and the relatively small mass of internal organs ensures a high yield of flogging - up to 90% [7]. The high yield of the edible part of the fish body is a valuable quality of this species in terms of its production properties. Based on studies of the chemical composition, it was found that the clarium catfish belongs to protein and medium-fat fish with a protein content of 16.6% and 6.4% lipids, while the amino acid composition of the proteins in the muscle tissue of the catfish is characterized by a fairly high content of essential amino acids (49.4 %). Among all the essential acids, the content of such important amino acids as leucine and lysine turned out to be in the maximum amount [8; 9]. The limiting amino acids were methionine and tryptophan. Increasing the content of limiting amino acids, as well as other nutrients, is possible through the use of combination principles based on the use of raw materials with different functional properties (processed products and waste of plant and animal origin). The advantage of plant raw materials is the ability to adjust not only the amino acid composition of minced meat, but also add dietary fiber to it, which is low in calories and, being prebiotics, stimulates the growth of beneficial microflora in the large intestine [10].

One of the directions for improving the nutritional and biological value of combined fish masses is the use of legumes, one of which is grain beans, containing up to 30% protein, rich in minerals and fiber, as well as vitamins B, PP, which, according to many researchers, distinguishes beans from other legumes, providing both nutritional and biological value of the finished culinary product [11; 12].

Purpose was development of a modified recipes for combined cutlet masses based on minced catfish and bean flour.

Materials and research methods

Objects of research.

The following objects were selected as research objects:

- combined fish mass from clarium catfish according to the classic recipe and with the addition of red bean flour in different concentrations;

Minced African catfish was prepared by grinding fish fillets on the skin (GOST 814-2019 Chilled fish. Technical conditions). Finely ground fish mince without visible muscle tissue fibers was obtained from coarsely ground fish mince by repeatedly passing through a meat grinder with a knife grid with a hole diameter of 3 mm.

Red bean flour was obtained by sequentially grinding bean seeds (GOST 7758-2020 “Food beans. Technical conditions”) in the grinding mechanism of a universal kitchen machine (UKM) and in a laboratory mill Quadrumat Junior.

In addition, the following was used in the outlet recipe:

- wheat bread of the first or highest grade(GOST R 58233 – 2018. Bread made from wheat flour.Technical conditions);

- water(GOST R 51232 – 98. Drinking water. General requirements for the organization and methods of quality control);

- table salt (GOST R 51574 - 2018.Eating salt. General technical conditions);

- pepper (GOST ISO 973-2016. Spices.Allspice [Pimentadioica (L.) Merr.] Beans or ground. Specifications);

The basic recipe is presented in Table 1.

Table 1

Unified recipe for minced fish from catfish for the production of chopped semi-finished products of a high degree of readiness

No.	Ingredients	Output, g	
		Gross	Net
1	Fish	123.5	65.0
2	Bread	-	18.0
3	Water	-	25.0
4	Salt	-	1.0
5	Pepper	-	0.05
6	Wheat crackers	-	10.0
7	Weight of semi-finished product	-	115

The recipe for outlet masses of model samples provided for the replacement of bread partially and (or) completely bean flour in the following proportions:30% (5.4 grams), 50% (9.0 grams), 70% (12.6 grams) 100% (18.0 grams) by weight of bread, as well as with the content of the hydraulic module with different watering.

Losses are taken into account in the recipes: when mixing - 1%, when molding - 1%, when frying - 10%.

Research methods.

Determination of the change in the mass of the hydraulic module, the mass of the output of semi-finished products and finished products was carried out in accordance with GOST R 54607.2-2012 Catering services. Methods of laboratory control of public food products. Part 2. Methods of physical and chemical tests.

To assess objectively the consumer properties of cutlets from the developed fish masses, it is proposed to use a profile method of organoleptic assessment in accordance with GOST ISO 16820-2015. Interstate standard. Organoleptic analysis. Methodology. Sequential analysis.

Research results

Replacing bread with bean flour is due to the need to increase the unadjusted coefficient of amino acid digestibility and reduce the glycemic load, while 100% introduction of bean flour allows this food system to be considered gluten-free.

Bean flour is a dry gel containing a large number of different substances that require water: carbohydrates represented by polysaccharides of the bean cell walls, the main substances contained in the grain - starch and protein. To ensure that the dry gel does not absorb moisture intended for soluble animal (fish) proteins and the finished product has a delicate texture, it is proposed to pre-hydrate the bean flour.

Table 2 and Figure 1 show the results of justifying an adequate amount of water for the formation of a hydraulic module.

Table 2

Determination of water absorption by bean flour (at a water temperature of 18±2 oC)

Results	Hydromodulus (ratio of flour and water)				
	1:1	1:2	1:3	1:4	1:5
Water absorption	Fully	Fully	Fully	Not completely	Not completely
Volume increase	2	3	4	4	4

Dynamics of moisture absorption in hydraulic modules in a component ratio of 1:1; 1:2; 1:3; 1:4 and 1:5 is shown in Figure 1.

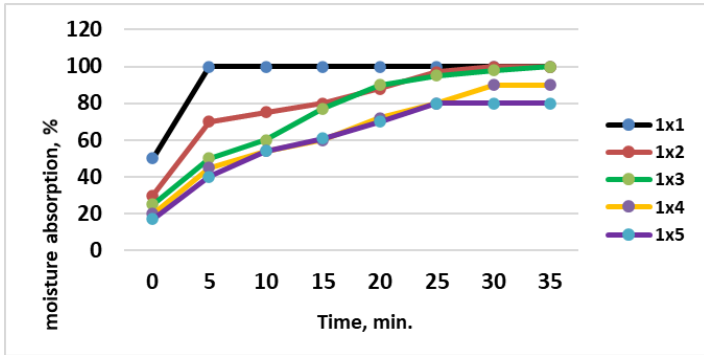


Figure 1. Time dependence of moisture absorption in hydraulic modules

It should be noted that for hydromodules 1:4 and 1:5, complete absorption of moisture does not occur. Sufficient time for watering the bean flour is required from 5 minutes for a 1:1 hydromodule to 35 minutes for a 1:3 hydromodule.

Based on the data obtained, it was decided to use 1:1 hydromodules for preliminary watering of bean flour; 1:2; 1:3.

The quality of the minced meat system was studied by replacing bread with bean flour (30%) with different hydromodules (Figure 2)

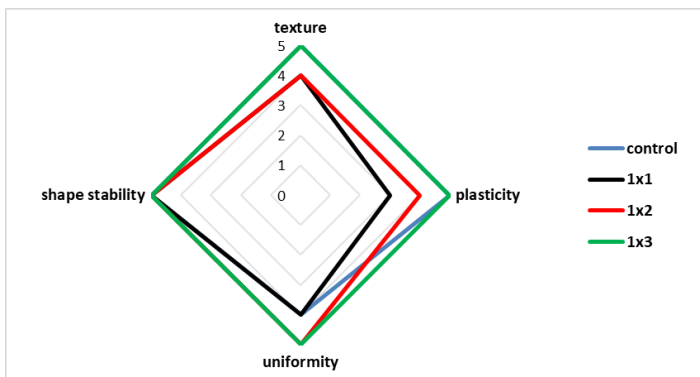


Figure 2. Changes in visual structural indicators of the minced meat system with different hydraulic modules

From Figure 2 it follows that the system with a hydromodulus of 1:3 has the most plastic, uniform texture and stable shape of the semi-finished product; this can be explained by the fact that the proteins of the beans and minced fish distributed moisture among themselves and it is enough to form the minced structure.

Development of a recipe for modifying the minced meat mixture by varying the mass fraction of bread and bean flour in order to obtain a semi-finished product that meets the following organoleptic parameters: texture, plasticity, shape stability, color consistency, uniformity and brightness of aroma.

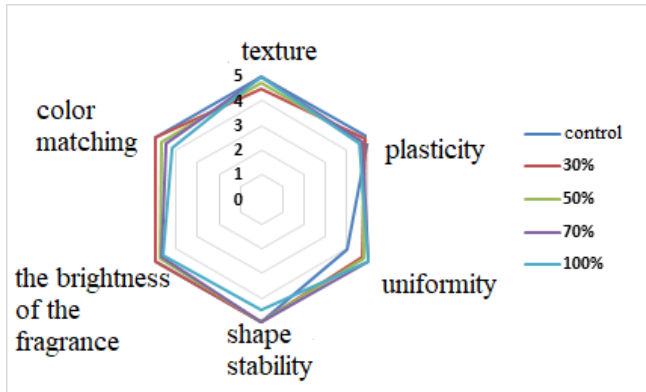


Figure 3. Sensory evaluation of semi-finished products with different amounts of bean flour.

From Figure 3 it is obvious that all samples of semi-finished products have high quality indicators, the variable difference is not significant.

Prototype recipe highly prepared semi-finished products with the addition of bean flour are presented in Tables 2.

Table 2

Recipe for prototypes semi-finished products of a high degree of readiness with the addition of red bean flour (RFF) 30%, 50%, 70%, 100% by weight of bread.

No.	Ingredients	Sample 1 (30% IFC)	Sample 2 (50% IFC)	Sample 3 (70% IFC)	Sample 4 (100% IFC)
1	Fish	65.0	65.0	65.0	65.0
2	Bread	12.6	9.0	5.4	-
3	Water	25.0	25.0	25.0	25.0
4	Salt	1.0	1.0	1.0	1.0
5	Pepper	0.05	0.05	0.05	0.05
6	Wheat crackers	10.0	10.0	10.0	10.0
7	Red bean flour	5.4	9.0	12.6	18.0
8	Hydraulic module	16.2	27.0	37.8	54.0
9	S/F output	131	142	152	168
10	Output of the finished product	114	124	132	146

Weight loss during standard heat treatment was 13% for all samples. Organoleptic evaluation of finished products is presented in Figure 4.

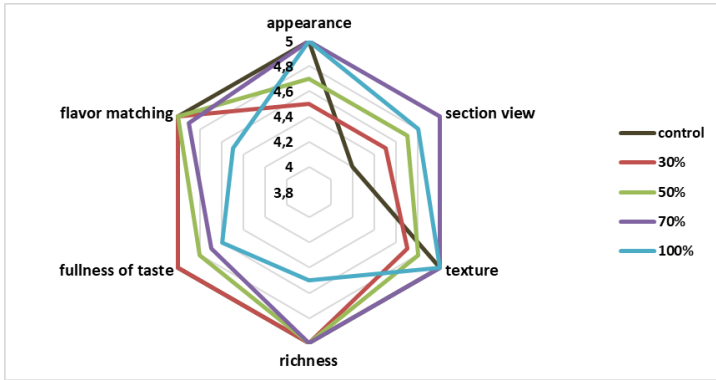


Figure 4. Results of assessing the organoleptic characteristics of the finished product

Thus, the results of the organoleptic evaluation of the presented samples of cutlets allowed us to draw a conclusion about the possibility of improving the organoleptic characteristics of cutlets by adding bean flour to the minced fish.

These concentrations also make it possible, with a stable quality of fish products, to give them a functional focus by increasing the amount of protein, especially with 100% replacement. At the same time, along with the enrichment of the product, the technological problem of forming the necessary consistency and improving the properties of the product is solved.

Vegetable additives in cutlets allow you to enrich them with vitamins, complete proteins, dietary fiber, and minerals. This allows you to improve the quality of products, give them a functional focus and create products for dietary purposes, improve the economic indicators of production: increase the volume of production while reducing the consumption of raw meat, allows you to use rationally raw materials without complicating the technological process.

Conclusions.

The conducted studies confirmed the possibility of improving the organoleptic characteristics of cutlets by adding bean flour in a certain amount to minced fish.

The production of combined products based on fish and plant raw materials leads to mutual enrichment of their compositions, a combination of functional and technological properties, increased biological value, and improved organoleptic characteristics of the finished product.

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科学出版物

上合组织国家的科学研究：协同和一体化

国际科学大会的材料

2024 年 4 月 26 日。中国北京

编辑A. A. Siliverstova

校正A. I. 尼古拉耶夫

2024 年 4 月 26 日。中国北京

USL。沸点：98.7。 订单253. 流通500份。

在编辑和出版中心印制

无限出版社

