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The collection includes scientific articles of participants of the International University Science Forum, the purpose of which is to present significant results of scientific research in the field of humanities, natural and technical sciences; the formation of a modern level of scientific knowledge, experience in transformation of theoretical science into the sphere of practical application of innovations; generalization of research and practical experience. The forum is a tool for establishing sustainable ties, as well as the exchange of experience between teachers and researchers of universities and research organizations.

Le recueil comprend des articles scientifiques des participants du Forum Scientifique International des Universités, dont l'objectif est la présentation des résultats significatifs de la recherche dans le domaine des sciences humaines, de la nature et de l'ingénieur; la formation du niveau contemporain des connaissances scientifiques, de l'expérience de la transformation de la science théorique au champ de l'application pratique des innovations; la synthèse de l'expérience des recherches scientifiques et pratiques. Le forum est un instrument permettant d'établir des liens durables et d'échanger des données d'expérience entre les enseignants et les chercheurs des universités et les organisations scientifiques.

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The issue of creating a flexible and sustainable system of regions economic administration at various levels of government (national, regional and municipal) is a priority both from the state and regional community point of view. This is due to objective external and internal factors, as well as to shortcomings of the existing management system. State administration of territorial development (including regional policy) is aimed at a conscious legal, political and ideological impact on the factors transforming individual territorial entities and/or their associations (unions) in order to overcome intra - and inter-territorial contradictions to increase their territorial, labor, financial resources and other capacities constantly.

Keywords: region, state policy, management/administration, development, model, practice, factors, tools.

One of the main features of modern economy is its multi-level territorial organization, the ability of social reproduction to act as interconnected territorial-economic systems (regions, territories, districts) [1]. The necessity of taking into consideration the territorial factor in economic development is caused by changes in the economic area, which in the conditions of constant interaction of the main participants of social reproduction, lead to imbalances in the regions economic and social development [2].

The aim of regional policy can be the harmonization of “the spatial development of the country by eliminating the existing territorial imbalances and developing the regions using their existing advantages (natural, climatic, transport, etc.)” [3, p. 23], as well as "the achievement of complex socio-economic development of the region" [4, p. 47]. In other words, the state administration of territorial development (including regional policy) is aimed at

a conscious legal, political and ideological impact on the factors transforming individual territorial entities and/or their associations (unions) in order to overcome intra - and inter-territorial contradictions to increase their territorial, labor, financial resources and other capacities/ potential constantly.

It should be emphasized that solutions to regional problems play an important role in the development of most countries of the world, especially at the stages of significant economic, social and political changes [5, p. 44]. The world experience of state administration of regions development indicates that the most effective tool for identifying and overcoming negative trends in the economic and social development of territories can be, firstly, forecasting and planning; secondly, economic zoning, which allows to reflect the current situation in a particular territory as accurately as possible; thirdly, target-oriented programming, which makes it possible to determine not only the goal, the implementation of a particular program will be aimed at, but specific steps to achieve the set goal as well.

Thus, currently existing "system of documents regulating the spatial organization of society at the regional level, with all their imperfections, is an invaluable source of information about specific regions, main regional problems, possible ways to solve these problems" [6, p. 270].

Currently, there are two main trends in application of the State policies of territorial development: economic and social ones.

Among the major economic tasks of the state policy of territorial development implementation are: supporting and strengthening of the economic leadership of adapted to the market modernizing municipalities , due to the development of market and production infrastructures for one; promoting the effective specialization of municipal economies, taking into account their competitive advantages; formation of effective (in terms of improving competitiveness) inter-municipal ties [7, p. 299].

The social orientation characterizing another part of the major tasks of territorial development state policy includes: firstly, evening-up of significant territorial differentiation in terms of their social development to the necessary (favorable) proportions. Secondly, focusing on municipalities, the development of which is taking place at a fairly low pace, but in the long term perspective being the most demanded due to their resource, labor and financial potential. Thirdly, increasing the balance of spatial regional development. Fourthly, financial support of the economy of depressed territories. Fifthly, formation of new or establishing existing inter-territorial ties, which allow integration of economically strong and weak territorial entities.

The solution of the above-mentioned problems is possible only if the

following principles of spatial development of the economy of certain territories are mandatory:

1. Observance of the hierarchy of development objectives of individual territories - the prevailing of common regional development objectives over municipal ones, which ensure overcoming of internal regional imbalances.

2. The principle of multipolar development of the region, which allows for the creation of a development space for municipal entities of various specializations, using all the advantages of the territorial diversity of the population economic activity conditions. The implementation of this principle involves stimulating the economic development of territorial socio-economic systems by creating new growth hubs [7, p. 300].

3. The principle of compensation, which assumes "the establishment of a set of special development measures - subsidies aimed not only at equalizing budgeting, but also at supporting regional development projects, projects financed by the investment fund, special economic zones" regarding depressive territories [8 , p. 13].

It should be noted that considering the above-mentioned principles of the spatial development of the economy of individual territories as a kind of rules for observing social relations between participants in economic and social processes in individual territories, the issue of their composition is becoming relevant. Regarding the object-subject composition of the participants in the state policy of territorial development, George Anderson believes "that any policy is aimed at solving public problems, and the existence of these two terms defines different approaches to policy development, which suggests that differences between subjects and objects of politics are currently becoming less visible. Political institutions and organizations, social groups and individuals can act as subjects and objects of politics [9, p. 19]. According to Pikulkin A.V., public policy contains a set of aims, objectives and priorities of the development of targeted programs which relate to public authorities with the involvement of modern civil society institutions [10, p. 176].

The political cycle is the process of creating and implementing a policy or different policies by the state and includes four stages [11, p. 115]: The first stage includes the analysis of the situation, the selection of priority social problems, making decision to develop a policy in the conflict sphere, the definition of its main objectives and directions. The second stage contains targeted programs, their coordination, adoption of an official policy / program document with identification of funding sources. The third stage covers direct policy development, monitoring and control of its

implementation. The fourth stage contains assessment of the results and consequences.

The world practice of developing various government policies has developed the basic models [12, p. 103]: The 'top-down' model assumes that state decisions are made at the highest governmental levels, and lower levels are passive performers; 'the bottom-up' model assumes that the formation of public policy begins with lower governance structures with the active involvement of public institutions; the "centralized model" assumes that politics is formed and implemented by the bureaucratic apparatus without taking public opinion into account; "the democratic model" assumes that while maintaining centralized governance, the state creates the conditions for promotion of citizens activity , using mechanisms of public associations attraction to the development of state policy.

Regional policy can act as "a system of goals and tasks of state authorities in managing the political, economic and social development of the country's regions" [13, p. 196].

Currently, there are many problems in the process of the state regional policy application. For example, "the policy of budget evening-up made the economic situation of the constituent entities of the Russian Federation even more complicated, while being a priority trend in the implementation of regional policy. The need to develop completely new measures to implement the state policy in the region has now been recognized at the federal level "[12, p. 151].

The main objectives of state regional policy are: "the formation of a single economic and legal area, taking into account the interests and priorities of regional development; creation of conditions for ensuring sustainable economic and social development of each region; creating conditions to ensure equal quality of life in different regions"[11, p. 88].

One of the effective constants of the modern world order is the system of the state administration of the economic and social development of individual territories. The major task of the state administration of the economic and social development of individual territories is "to systematically identify and eliminate problematic aspects, as well as maintain positive trends in the development of the territory" [14, p. 190].

Mandatory conditions of the effective management of current processes in the regions include detection, identification, and accounting of imbalances in economic and social development, which is a prerequisite for eliminating or reducing the consequences of their presence using special tools.

However, in the current practice of economic and social development

of individual territories (regions, territories, districts), the identification of existing problem areas in the development of territories is insufficiently effective, since it does not consider the patterns and causes of regional imbalances. “In this area of regional research, there is an insufficient study of factors that determine the direction of development of territories depending on the emerging imbalances and further transformation of the region” [14, p. 192]. The region’s economy administration system is the most complex set of components (governing bodies, their functions and structure; targeted strategic goals; principles, methods, technologies and management tools; resources, reproductive potential, organizational culture, competencies), closely interconnected, forming a managing and managed, instrumental and associated subsystems in their integrity and forming a mechanism for influencing the regional economy, living conditions of people, organizations, social and economic processes in order to improve the socio-economic development and quality of life of the population [15, p. 26].

The regional economy administration system should ensure the achievement of the following requirements: compliance of the main management functions (goal setting, stimulation and regulation) with the national economic and social policies, and the compliance of the main management functions with the current market conditions; ensuring coordination of structural transformations and integration of economic and social interests in the system of national interests; ensuring the integrity and balance of the regional economy; use of their own available potential based on the optimal combination of factors of expanded reproduction, flexibility and adaptability of the regional economy; support of a creative (non-standard) approach in all spheres of life of the regional, municipal community; ensuring the competitiveness of the territory or territorial formation.

The current stage of using the regional development management system is characterized by the separation of two basic (theoretical) management models: the European and the Asian ones. The term “national model ”was introduced in the last quarter of the 20th century. The very concept of “model” has several interpretations. Only two of them are applicable to the realities of the world economy. In the first one, a model is a schematic description of a phenomenon or process in society. The second model is a sample that serves as a standard for replication”[16, p. 71].

At the same time, in practice, several other modified control models are used in different countries of the world.

The first model is the socio-economic model of the United States. The

American model is characterized as balance of the traditional and the emerging economies. In a traditional economy, the state creates necessary conditions for business development, supports entrepreneurial activity; the share of the state in GDP production is relatively small.

The latest approach is characterized by a shift in the focus of attention to small-scale and diversified production, as well as to an increase in the role of science in the production. This model is applied only in the United States.

The European model of state administration exists as a combination of some essential features that are typical as a fact or as a trend for the majority of European countries but are unusual for any other significant group of countries. The formation of this model is associated with the process of European integration within the EU [17, p. 52].

The most significant common characteristics of the European model of state administration are: firstly, the parliamentary system of government. The head of government is formally appointed by the head of state or elected by parliament on the basis of a party majority established in parliament through elections. Secondly, the common feature of this model is the dominance of proportional electoral systems and multi-party coalition governments in EU countries. Thirdly, a common feature (as a fact in old democracies or as a trend in new ones) is decentralization of power, i.e. transfer of a significant amount of power and functions in public administration from the central to the regional or local level. The most important elements of the European model are the independence and clear functioning of all types of courts and authorities, including constitutional courts, which limits the power of parliament.

Recently, the Asian economic model is attracting an increasing interest. Over the past decades, the growth rates of the economies of East and Southeast Asia have become a matter of interest to many scientists. This is due to the fact that these countries used the strategy of “catching up development”. Such countries as Taiwan, Singapore, Malaysia, Thailand and Indonesia have achieved great results. These countries used to lag behind in their development. These countries started to apply the experience and technologies accumulated in the developed countries [18, p. 69]. The experience of the countries of East and Southeast Asia may be the most relevant for developing countries, since the authority of the executive branch and its bodies is the basis of state administration. The effectiveness of this policy was largely due to the fact that it combined the limitation of external competition (through protectionist trade and monetary policies) with the stimulation of intra-industry competition, mainly through investments and technical innovations [18, p. 100].

The emergence of the Asian model of governance is associated with

the characteristics of Asian countries that are steeped in Buddhist philosophy and worldview. In response to the fact that the Western governance model used in Asia was not effective, the need to form its own governance model, which later became known as the “Asian” one, arose. The use of this model took place in almost all Asian countries and has not been completed yet. The most active and productive development of a new specific model, the concept of administration, took place in Japan, and then it was adapted by other countries.

Despite its advantages, the Asian model of economic development of territories has a number of disadvantages. These include the lack of political freedom; the close interconnection between business and government; weak banking system. However, the existence of these disadvantages has not greatly affected the effectiveness of the Asian model. This model has some negative aspects: the limitation of the market causes its oversaturation with goods and services; the active influence of globalization processes affects the development of the economy. In general, Japanese management is distinguished by an emphasis on improving human relations, especially on coherence, group orientation, moral qualities of employees, stable employment and harmonization of relations between workers and managers [19, p. 128].

Thus, each of these management models is relatively effective, since it takes into account the mental, territorial, religious, regulatory, social trends of the territory it is applied to.

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PUBLIC-PRIVATE PARTNERSHIP IN CANADA: LESSONS FOR RUSSIA

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During the last decade, the institute of public-private partnership (PPP) is developing quite intensively in Russia. The PPP legal framework significantly strengthened, the sectoral range of PPP projects expanded, the demand for PPP mechanisms in the regions grew visibly. However, still there are problems to be solved. Obviously, exploration of the best world practices and its possible adaptation to Russian conditions can help to improve the efficiency of PPPs in Russia.

Analysis of PPPs in Canada, one of the world eminent leaders in this sphere, allows to identify some specific features of the "Canadian PPP model" and to highlight a number of its strengths. As the result of the research it is concluded that application of some of its rational elements can help to improve the efficiency of PPP governance in Russia. Specifically, we are talking about long-term planning of infrastructure development, establishment of infrastructure funds, strengthening of PPP institutional framework in the regions, establishing of a solid public support system for PPP.

Keywords: public-private partnership, public governance, long-term planning of infrastructure, infrastructure funds, legislative and regulatory framework, special PPP bodies, public support system

Today, Canada is one of the world leaders in using public-private partnership (PPP) mechanisms. All the key basic elements of the PPP institutional environment - a solid institutional and legal framework, strong financial markets, public support system, active and wide application of PPPs at the regional level – are developed in balance. PPP mechanisms in Canada are so efficient that there is virtually no failed PPP projects. The success achieved in the development of PPPs, the scale and high efficiency of the partnership mechanisms, as well as a number of features

of national practice gave grounds to speak not only about the creation of the “Canadian model” of PPPs (1), but also that it “definitely surpassed the original model of the UK” (2).

PPPs make a tangible contribution to the development of Canadian infrastructure and the national economy in general. As noted by the President of the National Council of PPP, PPPs became “the engine of economic development” and played an important role in overcoming the consequences of the global financial and economic crises (3).

The Canadians have studied and implemented many of the world best PPP practices, developed and expanded PPP projects market, worked out mechanisms for projects structuring and implementation, ensured the pipeline of PPP projects, and accumulated important experience of trust and partnership between government and business.

PPP institutional framework

Canada is one of the first countries in the world to put infrastructure development on a long-term planning basis. The use of long-term planning allows to provide a unified approach to the whole infrastructure complex, to build target development priorities, to determine its quantitative and qualitative parameters, as well as the sequence of actions. Federal investment infrastructure plans in Canada have become an integral part of the government's economic policy. In 2007 “Building Canada Plan” was adopted and successfully implemented. In 2013, the government announced the adoption of the 10-year "New Build Canada Plan", the largest and longest-running investment plan in the country's history (4). The infrastructure plan is closely connected with PPP mechanisms: so-called P3 screening is widely used in projects selection. PPP screening is a tool for thorough verification of all projects worth more than $ 100 million for the applicability of PPP mechanisms in their implementation, while funding is be allocated only if the effectiveness of the implementation of a project based on PPP is confirmed (5).

A solid institutional framework for PPP public governance in the form of special PPP bodies has been established at various levels. It ensures both the unity of the state approach to PPPs as well planned and coordinated actions of various departments.

Infrastructure Canada Inc. under the Ministry of infrastructure and Communities is the key government structure responsible for development of the country's infrastructure complex. Its functions include participating in development of federal infrastructure policies, coordinating activities of ministries and departments, analyzing and evaluating strategic infrastructure investments (6).

PPP Canada, a state Corporation, plays an important role in the PPP public governance in Canada. The main tasks of this body include development of national infrastructure through PPP mechanisms, financial support for relevant initiatives, conducting educational and methodological activities, dissemination PPP best practices, standardization of PPP contracts. PPP Canada has been directly involved – either as an investor or a consultant - in the implementation of a large number of PPP projects (7).

The role of the Canadian Council for Public-Private Partnerships is very important in the system of PPP bodies in Canada. The Council brings together representatives of public and private sectors. Its main tasks are to "promote innovative mechanisms for infrastructure development based on public-private partnerships at all levels", disseminate information about forms and mechanisms of PPP, successful practices, organize conferences and seminars, conduct research on various aspects of PPP, conduct public opinion polls on PPP issues, etc. Every year, the Council recognizes the most successful PPP projects through the National awards program. (8)

One of the specific features of the Canadian PPP experience is an active role of regions in PPP development. Today, practically all Canadian provinces have special PPP bodies. These bodies (Partnerships British Columbia (Partnerships BC), Alberta Infrastructure, Ontario Infrastructure Projects Corporation, Agence des partenariats public-privé du Québec (PPP Québec) have various organizational and legal forms that reflect specifics of local government, models of government-business community, traditions of doing business, etc.

Despite the variety of organizational forms of PPP bodies in Canadian regions, their functions are largely similar and include analysis of public infrastructure in the province and the best ways to implement infrastructure projects, planning of PPP projects, technical and economic assessment and structuring of PPP projects, assistance in contract preparation, development of methodological guidelines on PPPs.

Public support for PPP

Public support for PPPs in Canada is provided in several key areas: financial, methodological, and informational.

For about a decade, the major tool for financial assistance to PPP projects in the country was PPP Canada Fund, managed by PPP Canada Inc. The Fund, formed in 2007, was the first specialized financial instrument in the country for implementing PPP projects. The support provided from the Fund could reach up to 25% of the project cost. The Fund had launched and implemented projects in transport, water supply, energy, security,

waste management, culture, sports, telecommunications, etc. The Fund has proved to be a highly sought-after tool in Canadian regions: it had funded PPP projects in 6 provinces and 13 municipalities of the country. The multiplicative effect of the Fund's work made it possible to attract $ 6.6 billion of private investment to PPP projects, i.e. it had a 5:1 effect (9).

In 2017 Canada Infrastructure Bank, a new institution to facilitate infrastructure development, began its operations. It is expected that the Bank will invest up to $35 billion in infrastructure over several years, thereby mobilizing private capital (10).

Information, advisory and methodological assistance provided by the state to PPPs is of great importance too. PPP Canada and the National PPP Council have worked out a wide range of guidelines that serve as road maps on various aspects of PPP, including *The Guide to the New Building Canada Fund. P3 Screen – Suitability Assessment; Schematic Design Estimate Guide; New Building Canada Fund: Procurement Options Analysis Guide; PPP Canada. P3 Business Case Development Guide; Federal P3 Screen: The Guide for Federal Departments & Agencies; Application Guide & Application Form,* etc. (11).

Current state of the PPPs and its impact on the socio-economic development of Canada

Currently, there are 287 PPP projects at various stages of implementation in Canada with a total cost of about $139 billion (12). The sectoral spectrum of PPPs is very wide. The largest number of PPP projects in the country are in healthcare and transport infrastructure (35% and 20% of the total number of projects, respectively). PPP mechanisms are also used in education and energy, environmental protection, recreation, culture and recreation, judicial and penitentiary systems.

Canadian studies of the macroeconomic impact of PPP development on socio-economic development strongly suggest that this impact is positive, large-scale and multi-vector (13). The macroeconomic effect of PPP is analyzed through the prism of employment, dynamics of tax revenues from PPP projects, their economic efficiency, expanding the range and improving the quality of services and other parameters.

The implementation of PPP projects contributed a significant increase to the country's GDP. The impact of PPP projects on employment is also impressive: they directly or indirectly generated creation of more than 500,000 full-time jobs, including about 300,000 directly in PPP projects. Tax revenues from the implementation of PPP projects amounted to $7.5 billion, of which 2/3 went to the Federal Treasury, and a third – to the provinces. Calculations also confirm the economic efficiency of PPP projects

in comparison with public procurement: the economic effect of implementing infrastructure projects under the PPP scheme in comparison with public procurement is estimated at $ 9.9 billion (14).

Efficiency of PPP project management in Canada

International experts believe PPP project management in Canada is probably one of the most effective in the world (15). PPP bodies in the Canadian regions are staffed with qualified professional teams that are able to structure projects efficiently and effectively monitor and control its implementation. As a result, the vast majority of Canadian PPP projects are devoid of problems such as frequent contract renegotiation, serious conflicts between partners, project bankruptcy, and government compensation for private partner losses (1).

According to KPMG analysts, the average time from tenders to financial closing of projects in Canada has decreased to 16 months, while in the UK it is 34 months. According to the National PPP Council of Canada, the competitive costs of tender winners in Canada (on average 0.5-1.5% of the cost of projects) are much lower today than in the UK (5-6%) (16).

The PPP market in Canada is competitive, as evidenced by the presence of a large number of investors and operators who express their willingness to deal with PPP projects. The list of participants in PPP projects in Canada includes such world-famous companies as Canadian Black & McDonald, Ellis Don Corporation, PCL Constructors, SNC Lavalin, as well as Acciona (Spain), Bouygues (France), Honeywell (USA), Innisfree (UK), Johnson Controls (USA), Plenary Group (Australia). It is obvious that the participation of such “grandees” provides a really effective competition, which results in an increase in the quality and price parameters of projects (2).

One of the reasons for PPPs success in Canada is that the state has managed to find optimal contractual models for PPP projects that suit both public and private partners in terms of risk sharing. The vast majority of PPP projects use the DBF (design–build-finance), DBFM (design-build-finance-service) and DBFOM (design–build–finance–operation-service) models. The key advantages of these models for the public sector are the retention of the ownership of assets, elaboration of facility specifications by the public partner, the certainty of value and timing of construction, the transfer of design and construction risks to the private partner. For the private partner, the main benefits are that the risks of final demand are carried by the state, the funds invested by the private partner are guaranteed to be compensated after the commissioning of the object by regular payments from the state (provided, of course, that the quality and time parameters of the project are met), etc.

Another feature of the “Canadian model” of PPP is the active use of non-bank financing of PPP projects, in particular, pension funds. Canada has one of the most developed markets in the world for securities issued in connection with PPP projects, and since the early 2000-s Canadian pension funds have been the leading investors in infrastructure. Today, along with Australia, Canada has the highest share of infrastructure assets in total assets of pension funds in the world (5% compared to the global average of 1%) (2)

Research on PPP in Canada shows that the success of PPPs depends to a large extent on the political will of the state, its desire to steadily move towards establishing and deepening partnerships with businesses, the formation of an appropriate institutional environment for development of PPPs. The example of Canada is another confirmation that the proactive position of the state is one of the most important factors that ensure PPP success. Over the past decade, the government of Canada has firmly integrated PPP mechanisms into its economic policy and has taken a range of measures to support them and further develop them on a systematic basis. During this time, government bodies have accumulated considerable experience in PPP governance, including provision of legal, financial and other services, developing guidelines and manuals on various aspects of PPP (project financing, contract preparation, project screening, etc.).

The results of sociological research commissioned by the National PPP Council show that the institution of public-private partnership and the idea of using PPP mechanisms for infrastructure development are highly supported by the population. People demonstrate not only a general acquaintance with PPP, but are also aware of its benefits for employment, stimulation of economic growth, expanding the range and improving the quality of services (18).

Conclusion

Canada's experience in PPP is particularly interesting for Russia for a number of reasons.

First, Canadian practices of PPP organization and management have gained wide recognition around the world and are deservedly considered advanced. The Canadian experience is studied and used by a large number of countries.

Some factors of economic development are similar or coincide in two countries: natural and climatic conditions, geographical extent, federal structure, social orientation of the market economy model, etc.

Finally, the study of the most effective aspects of the Canadian PPP experience is particularly relevant in light of the fact that PPP development in Russia in recent years is becoming systematic, broad and active, and is increasingly approaching the “mainstream” of the government's economic policy. It is obvious that studying the best international practices, including Canadian ones, and adapting it to Russian conditions could help to improve the efficiency of PPPs in Russia.

Best practices of the Canadian experience include long-term planning of infrastructure development using PPP mechanisms. There has been a noticeable increase in the number of countries adopting long-term planning methods in their infrastructure policies in recent years, and Canada has been in this group of countries for a decade now.

The Canadian experience of creating infrastructure funds is also of interest. These tools have fully justified itself, successfully fulfilling its main task – to stimulate private investment in infrastructure projects with good indicators of financial leverage.

The Canadian system of public support for PPP development also deserves attention. Canada proves that the system of such support, primarily financial, is a very effective tool for PPP development. In addition to financial support, methodological assistance is widely used in the country in the form of the development of a large number of different types of manuals on various aspects of public-private partnership, provided both at the federal and regional levels.

The strong regional institutional PPP system in Canada is noteworthy. All provinces of the country have established PPP bodies staffed with qualified specialists who are able to structure PPP projects, calculate their effectiveness and evaluate comparative advantages, provide competent project support, monitor and control their implementation throughout the life cycle.

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HIGHER LAND MANAGEMENT EDUCATION IN THE RUSSIAN FEDERATION

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The problem of higher education is a priority for the strategic development of the professional land administration, cadastre and geodesy. Innovative development of the Russian economy requires the modernisation of higher education aimed at preparing professionals who are proficient in modern digital and intelligent technologies. Training of specialists in land administration and cadastre for the establishment of an effective land administration system in the country plays an important role. This situation is particularly acute in a number of regions of the Russian Federation, where is a lack of effective use of land resources despite their large number.

Keywords: personnel support, land management education, international cooperation

1. Land resources of the Russian Federation and personnel support

Setting up an efficient system of land resources management requires a highly professional staffing support, and primarily training of specialists with higher land use planning education.

Historically, the profession 'land use planner' takes the root from the professions of surveyor or arpentator. Currently, this profession is among the most prestigious ones on the job market. The social and economic significance of this profession is explained by the state approach to the regulation of land relations. Professions directly relating with land include soil scientist, agriculturist, architect, construction worker; yet a land use planner is responsible for the mission of completing the design of qualitative changes of land as the most precious natural resource and the main factor of economic growth.

Land use planner's job has a cross-sectoral nature, and its competencies integrate a wide array of sciences and education: Engineering, legal, economic, managerial, social and psychological. Land use planners are responsible for tackling many tasks including setting up rational use of agricultural lands, control over the condition of land resources, reclamation of damaged industrial lands, description of real property items, document drafting for residential construction, and resolution of land-related conflicts and disputes. Representatives of this profession form a special community of people who are able to think dimensionally and who are able to professionally manage databases and related technologies, and who nurture caring attitude to land.

As an independent type of economic activity, land use planning is part of Section M "Professional, scientific, and technical activity" and for the past several years this profession has been playing an ever more important role within the services occupations in the Russian Federation (Table 1).

The 2017 statistics enables us to briefly describe land use planning as an economic activity in Russia. The average annual headcount for the profession was less than 1% of the total population. Around 50% of land use planners are women, indicates gender equality. New employments and retirements account for roughly the same numbers: 22% of the headcount. More than 20,000 small enterprises and over 40,000 sole proprietors create an organizational and legal foundation for this activity. According to our estimates, the revenues (taking into account taxes and similar mandatory payments) from sales of land use planning services were RUB 70 billion.

The object of professional land use planners is land, and therefore not only quantitative and qualitative composition of land resources must be taken into account, but – importantly under market conditions – the structure of land ownership.

As it is commonly known, the Russian Federation is not only one of the largest Eurasian countries – it is the biggest nation in terms of its territory. The highest relative share in the structure of the RF land fund accounts for two categories: Forest lands (65.8%) and agricultural lands (22.4%), while the remaining land categories account for 1% to 5%, however, in absolute terms these are rather big numbers.

Privately owned lands in the land structure of the Russian Federation account for about 8%, and to date publicly owned and municipally owned lands continue to play a vital role in the Russian economy. That said, this circumstance indicates that there is a market potential for future profes-

sional activity of land use planners relating with a significant scope of work in terms of delineation and transformation of property relating with certain land categories.

Table 1. Land use planning within the system of the Russian Industry Classification System(OKVED 2)

Hierarchy	Code	Contents
Section	M	Professional, scientific, and technical activity
Class	71	Architectural activity and engineering and technical design, technical testing, research, and analysis
Subclass	71.1	Architectural activity, engineering survey, and technical consultations in these areas of knowledge
Group	71.12	Engineering survey, engineering and technical design, management of construction projects, construction supervision, and field supervision, provision of consulting services in these areas of knowledge
Subgroup	71.12.4	Geodesic and cartographic activity
Type	*71.12.46*	*Land use planning*

Sustainable development of agriculture and rural areas of the Russian Federation, ensuring food security is impossible without land as the main factor of agrarian production. As of the beginning of 2018, there were 383.2 million hectares of agricultural lands including 222.0 million hectares of agricultural lands, of which 122.7 million hectares of cropland, 92.5 million hectares of pastures and haylands, 1.9 million hectares of perennial plantings, 4.9 million hectares of deposits.

During the market reforms in Russia agricultural lands have been actively privatized as compared with lands of other categories. Fig. 1 shows an 8-year trend of this indicator: It is apparent that pubic and municipal forms of ownership prevail over private property. In the structure of forms of ownership, private property in 2017, just as in 2010, remains at the same level of 33%.

Delineation of public property to land remains a priority within the system of management of land resources. According to a federal statistical research, as of January 1, 2018 the share of delineated lands in the Russian Federation accounted for nearly 65% of the total area of lands subject to delineation. However, the share of delineated lands in urban settlements accounted for only 20.9%, while in rural settlements it accounted for a meagre 5.6% of the area of lands subject to delineation. The scope of delineation of state-owned lands in urban settlements was performed at the level of 12.6%, while in industrial lands – at the level of 19.2%. Table 2 contains theme-based information.

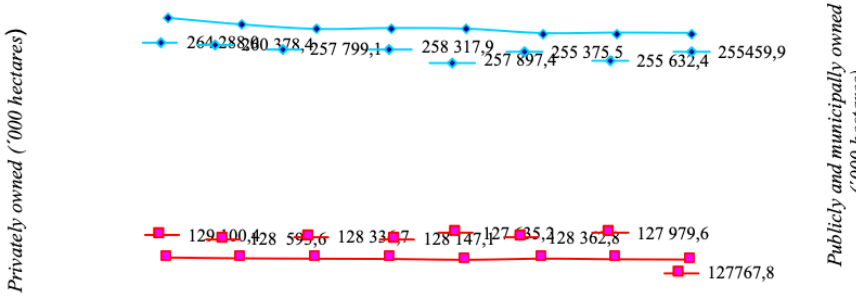

Fig. 1. Trends of distribution of agricultural lands by form of ownership

Overall, the analysis of the scope of work data, denominated in thousands of hectares of lands, on which a set of works must be performed in terms of formation, state cadastral accounting of land plots, as well as registraton of the corresponding title, shows that the public land delineation process will take, in our view, no less than 10-15 years, i.e. a relatively long period of time. In order to solve this important and complex national problem one should significantly increase the pace of growth, from several percentage points to the level of at least 8% - 10%.

Land use planning can be conditionally divided into two sections: Public and private. The former is represented by public and municipal management employees, while the latter is represented by entrepreneurs whose main activity is the provision of land use planning and cadastral services. Table 3 data suggest that in 2018 there was significant reduction in the number of employees of the federal and regional levels of management, although in our opinion there is a need to increase this indicator.

Public private partnerships are able to increase the quality of land use planning and cadastral services. Currently, on the Russian market nearly 40 thousand cadaster engineers render these services, and they are members of the total of 19 self-regulating organizations specialized in land use planning.

In reality, there is uneven distribution of land use planning engineers across Russian regions. For instance, in Moscow and Moscow Region there are 4,331 engineers, while in Nenets Autonomous District there are only 10 persons employed in this profession, even though the areas of these regions account for 4,690 thousand hectares and 17,680 thousand hectares, respectively.

According to the latest available data and on average per one cadaster engineer, there were 434 hectares and 3,725 persons, which is not enough, taking into account the objectives of the state and the private sector.

Table 2. Annual trend of the area of delineated state-owned and municipal lands*

Item #	Land Category	Delineated lands (as of the beginning of the year), million hectares			Annual growth rates, %		
		2016	2017	2018	2015	2016	2017
1	Agricultural land	26.2	27.8	29.8	-0.5	0.7	0.8
2	Settlements lands including:	1.6	1.8	1.9	0.6	1.2	0.8
2.1	Urban settlements	1.3	1.4	1.5	0.5	1.7	1.2
2.2	Rural settlements	0.4	0.4	0.5	0.6	0.8	0.5
3	Industrial and other special lands including:	11.2	11.3	11.5	0.8	0.4	1.1
4	Lands of specially protected territories and objects	37.4	38.9	40.9	15.0	3.4	4.1
5	Forestry land	922.0	916.6	938.8	2.4	-0.5	2.0
6	Water resource land	0.5	0.5	0.5	0.1	0.2	0.03
7	Land reserve	0.1	0.1	0.1	-0.04	0.001	0.01
	Total lands	998.9	997.0	1 023.6	2.1	-0.1	1.7

* - Negative trend in this indicator relates with conversion of lands from one category into another

Table 3. Headcount of employees of the Federal Service for Official Registration, Cadastre, and Cartography (Rosreestr) as of January 1st, persons

	Year		
	2013	2018	2023 (Forecast)
Total	41,861	32,141	~42,500
Including at the levels:			
Federal	596	511	~500
Regional	41,265	31,630	~42,000
For information only:			
Total headcount of federal public authorities and agencies, ’000 persons	1439	813	~1060
Share of Rosreestr employees in the total headcount, %	2,9	3,9	~4,0

As a consequence, the system of official registration is overloaded due to, among other reasons, the continued growth in the number of requests of interested persons relating with land use planning (Table 4).

Table 4. Quantity of fulfilled requested by the interested persons relating with land management in the Russian Federation ('000 units) *

Federal District	Year		
	2015	2017	2020 (Forecast by the authors)
Central Federal District	23	575	590
North Western Federal District	24	164	170
Southern Federal District	88**	445	460
Privolzhsky Federal District	10	454	470
Urals Federal District	7	143	150
Siberian Federal District	1	234	250
Far Eastern Federal District	1	57	100
Total for the Russian Federation	154	2072	2190

* Source: Rosreestr

** Southern Federal District and North-Caucasian Federal District

The strategy for staff management in the public and private sectors of land management, in our opinion, should be built upon the same principles of people motivation and career growth. The estimates show that the monthly salary of Rosreestr employees in 2017 was RUB 36,000, while private sector employees earned 45% more than the average Russian level, which is RUB 39,000. According to the Russian Association of Private Land use planners, the private sector as compared with the public sector of land use planning is typified by better indicators in terms of the number of specialists with higher land use planning education and staff turnover.

The variety of natural-climatic conditions and production and economic conditions for the development of the huge territory of Russian Federation must be based on new models of strategic management of land resources of the nation and by way of building of the innovative system of higher land use planning education.

2. Russian system of higher education in the field of land use planning

The modern stage of development of the Russian education in the field of land use planning is connected with implementation of qualitative changes based on the "Land Use Planner" professional standard, approved by the

Ministry of Labor and Social Security of the Russian Federation on May 5, 2018. As it was mentioned before, this economic activity is assigned code 71.12.46 according to the Russian classification.

The "Land Use Planner" professional standard consists of several sections. The general data state that the essence of such professional activity is to carry out the land use planning, with a main purpose of ensuring a rational use and protection of the lands, creation of favorable environment and landscape improvement. The other sections set out a functional map of this professional activity and characterize the generalized labor functions (Table 5).

The process of the professional standard development was initiated by the employers, including the National Land Use Planners Union of Russia, Union of Comprehensive Design and Land Use Planning of Rural Territories and the State University of Land Use Planning. The requirements to knowledge, proficiency and skills, which would satisfy the modern demand of the economy and the society, were formulated in particular by the employers.

Before its approval, the draft of the "Land Use Planner" professional standard has been passing during several years through a complicated procedure of intermediary approvals by the Federal Service for State Registration, Cadastre and Mapping (Rosreestr), Ministry of Economic Development of the Russian Federation, Council for Professional Qualifications of Agro-industrial Complex, National Council for Professional Qualifications at the President of the Russian Federation.

Further on, the "Land Use Planner" professional standard, when approved by the Ministry of Labor of Russia, will enhance the quality of education in the field of land use planning through the update of the State Educational Standards (SES). In this concern, the interaction between the professional community and institutions of higher education is assigned a crucial role.

Statistical data allow witnessing a positive dynamics of development of the higher education system in the field of land use planning and cadastres: the number of universities grows, the figures of admitted and graduated students improve on all educational programs, international cooperation between the universities with the close training profiles enhances. According to our forecast, such trend will persist in the future.

Table 5 sets out the data characterizing the progress of the Russian universities training the staff in the field of land use planning, cadastre and geodesy.

Taken as a whole, the Russian education in the field of land use planning represents a rather comprehensive multilevel system for training the staff with higher and secondary vocational education on the basis of applicable State Educational Standards (SES). Structure of SES of the second and third generations is stated below:

SES of Higher Vocational Education (HVE) (second generation) till 2015: 120300.62 Land use planning and cadastres (degree of bachelor); 120301.65 Land use planning (qualification of Engineer); 120302.65 Land cadastre (qualification of Engineer); 120303.65 City cadastre (qualification of Engineer); 120300.68 Land use planning and cadastres (degree of Master)

Table 5. Description of main functions, making part of the "Land Use Planner" professional standard

Code	Generalized functions	Labor functions	Qualification level
A	Preparation of data for compiling the land use planning documentation	Performance of investigations and survey during the land use planning	Secondary vocational education - training programs for middle-ranking specialists
		Assessment of quality of the lands, in order to get information whether such lands are suitable to be used for agriculture	
		Carrying out inventory taking of the lands	
B	Development of the land use planning documentation	Description of location and/or setting the borders on site of the land use objects	Higher education - Bachelor's degree
		Carrying out of natural and agricultural zoning of the lands and zoning of territories of the land use objects	
		Development of propositions for rational use planning and protection of the lands	
		Development of the design documentation for the land use planning	
C	Research in rational use and protection of the lands, improvement of the land use planning process	Analysis of scientific and teechnical problems in the field of land use planning	Higher education - Master's degree or Specialist's degree
		Statistical processing of information, mathematical and computer simulation of schemes and projects of the land use planning and formation of computer databases	
		Development of methods and new technologies for implementation of the land use planning, regulation of land relations, management of land resources and real estate	

FSES HVE (third generation) from 2011: 120700.62 Land use planning and cadastres (bachelors) (qualification (degree) "bachelor"); Profiles: Land use planning, Land cadastre, City cadastre, Real estate cadastre, Land resources management, Real estate management, Geodetic support to land use planning and cadastres, Land and real estate appraisal. 120700.68 Land use planning and cadastres (masters) (qualification (degree) "master").

FSES HE (generation 3+) from 2015: 21.03.02 Land use planning and cadastres (bachelor level) Profiles: Land use planning, Real estate cadastre, City cadastre, Land resources management, Real estate management, Land and real estate appraisal. 21.04.02 Land use and cadastres (master level) Profiles: Land use, real estate cadastre, Real estate management, Urban territories appraisal and management.

Table 6. Progress in number of universities of AMA - AMB*, training the staff in the field of land use planning and cadastres, number of admitted students and graduates

INDICATORS	YEARS			
	2014	2016	2018	2020 (forecast)
Total number of universities	82	87	104	110
including universities of the Ministry of Agriculture of the Russian Federation	33	34	40	45
universities of the Ministry of Education of the Russian Federation	49	53	64	65
Total number of admitted students	5920	6815	7295	7400
including for:				
Bachelor's program	5504	5521	5697	5750
Master's program	416	1294	1527	1550
Postgraduate program	*	*	71	100
Total number of graduates	5135	6627	5933	~6000
including:				
bachelors	901	5087	4963	~5000
masters	187	359	936	~950
Postgraduate students	*	*	34	~50
Number of universities awarding degrees	69	86	98	105
Total number of students	25482	25096	26873	~27000
Number of foreign universities, members of AMA	16	16	16	20

* Academic Methodological Association – Academic Methodological Board

The AMA system has been reformed in Russia over the recent years as follows: 9 Coordination Councils majoring in 9 fields of education were created at the Ministry of Education and Science of Russia, including 57 federal Academic and Methodological Associations for 57 Consolidated Groups of Specialties and Training Programs, including 23 in the field of engineering, technologies and engineering sciences.

The educational activities are also implemented in the State University of Land Use Planning in the form of advanced training courses:

Duration of 1–108 academic hours: 1. New developments in land use planning and cadastres. Fundamentals of cadastre activities. 2. Actual issues of cadastre activities, state cadastre record and keeping public database, obtained as a result of land use planning, including with application of information technologies. 3. Actual issues of land use planning and cadastres in the Russian Federation. 4. Status and future developments of land use planning and cadastres of the Russian Federation. Methodological basis and technology of interaction between the educational process subjects in the digital and information educational environment of the State University of Land Use Planning. Efficient management of land and natural resources, real estate and other business assets on the basis of market appraisal. Appraisal business. Actual issues of real estate. Innovative marketing and advertisement.

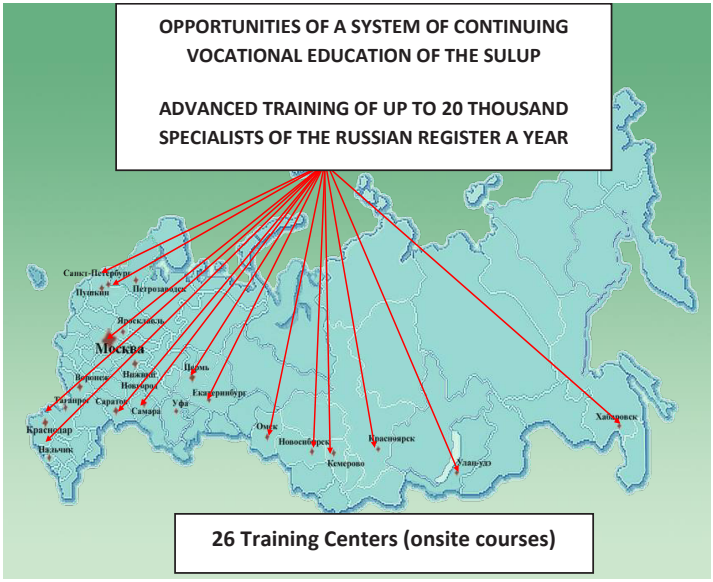

Figure 2. System of continuing vocational training of the State University of Land Use Planning

Duration of 250–1000 academic hours: Vocational retraining of a specialist in the field of cadastre business. Technologies of implementation and methodological support to subjects included into vocational modules of the specialty 120714 "Land and property relations" (for tutors of educational institutions of secondary vocational education majoring in the same field). Technologies of implementation of subjects of Main Academic Programs of Higher Vocational Education of the third generation for training bachelors majoring in "Land use planning and cadastres" (for tutors of universities). Cadastre business. Architecture and regional design. Real estate appraisal. Enterprise (business) appraisal. Marketing management. Management. Human Resources Management. Cadastre appraisal of real estate.

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DEVELOPMENT OF REQUIREMENTS FOR AN APPLIED INFORMATION SYSTEM FOR SUPPORTING SOLUTIONS OF ECONOMIC PROBLEMS BY A HIGH-TECH ENTERPRISE

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The analysis of the functions of applied automated information systems used in various fields of activity of a high-tech enterprise. Features of using a high-tech enterprise information systems to support decisions made in a turbulent environment have been identified. A set of requirements for an applied information system for supporting solutions to economic problems by a high-tech enterprise is proposed.

Keywords: high-tech enterprises, applied automated information systems, decision support systems, online analytical processing, data mining.

A key role in the concept of creating a digital economy in Russia is played by high-tech enterprises. These enterprises are focused on the use of technological equipment with a high level of automation, industrial robotics and information systems of various classes. The implementation of the digitalization concept at the level of high-tech enterprises requires the creation of applied automated information systems for managing various fields of activity, including the sphere of economic activity.

To manage the life cycle of product innovations created by a high-tech enterprise, Product Lifecycle Management (PLM systems) is appropriate [2]. Effective integration of management processes for various types of resources (material, intellectual and financial), as well as assets, allows providing ERP systems (Enterprise Resource Planning) [2, 4]. PDM systems (Product Data Management) are promising when managing information on the order portfolio of a high-tech enterprise. Using MES-systems (Manufacturing Execution System), production processes are managed in the structural links of a high-tech enterprise [1]. CRM systems (Customer Relationship Management) form the regulation of relationships with consumers of product innovations, increasing the effectiveness and efficiency of the interaction of a high-tech enterprise with the external environment [2].

To manage human resources, a high-tech enterprise integrates HRM systems (Human Resource Management) into a single information space. These systems provide savings in financial and time costs in the process of attracting intellectual resources by the enterprise. Equipment management is carried out by applying EAM-systems (Enterprise Asset Management) and MDC / MDA-systems (Manufacturing Data Collection / Manufacturing Data Acquisition). The first class of systems makes it possible to automate the processes of maintenance and repair of equipment, and the second - allows you to reduce the cost of generating a set of production data.

Within the framework of the BPM-concept (Business Process Management), which involves the effective management of business processes, a high-tech enterprise focuses on relevant information systems. Such systems make it possible to implement a range of management functions, including planning results and costs, organizing business processes, analyzing and controlling them. This class of systems covers Corporate Performance Management - CPM systems, Enterprise Performance Management - EPM systems, Strategic Enterprise Management - SEM systems. These systems enable a high-tech enterprise to compare goals and results, evaluating the effectiveness of functioning, as well as the results and costs of resources, evaluating the effectiveness of activities.

Thus, to ensure the effectiveness of all areas of activity, the formation of an applied automated information system that provides support for decision-making on economic problems [7] becomes an urgent task. Such a system has a high level of functionality. The development and use by a high-tech enterprise of systems of this class allows for a complete and objective analysis of objective activity. Such systems are aimed at organizing assistance to decision makers in conditions with a high level of

uncertainty of factors of the external and internal environment. The system makes it possible not only to collect information and its multicriteria analysis, but also to select the models that are most appropriate for the task, as well as form a set of alternative solutions.

The ideology of building a DSS is the embodiment of the integration of the theory of design of management information systems and database management systems. Structurally, DSS, encompassing a database, a model database, and a software subsystem, are an effective tool for analyzing problems that arise in the process of solving economic problems by a high-tech enterprise. These systems make it possible to minimize the influence of the human factor on decision-making processes, increasing the objectivity of decisions and reducing the risk of losses. Various methods are used in the development of DSS, including information retrieval, data mining, database knowledge search, case-based reasoning, simulation, evolutionary calculations and genetic algorithms, neural networks, situational analysis, cognitive modeling, etc. A number of these methods were formed as part of the development of artificial intelligence systems.

DSS is focused on the collection and analysis of large amounts of information. The results obtained as a result of the analysis make the decision-making process more objective and reliable. Interactive DSS become very relevant for a high-tech enterprise. Such systems enable the management of a high-tech enterprise to obtain the necessary information from a large number of primary sources. The analysis of such information allows not only to clarify the business models used by the enterprise that are used to solve economic problems, but also to create new models by introducing a larger number of factors into the circle of consideration.

Using DSS, a high-tech enterprise is able to monitor information flows, as well as control the process of creating various information and intellectual assets and intellectual capital. DSS provide an opportunity for a high-tech enterprise to model investment costs in innovative developments, the results of which are characterized by a high level of uncertainty and risk. Using DSS, a high-tech enterprise can forecast its revenues and expenses with high reliability when implementing a modernization strategy based on the introduction of new technological solutions (process, organizational and managerial innovations), while considering a wide range of alternative solutions.

An important area of application of DSS for a high-tech enterprise is the cost analysis of sales of product innovations with a different combination of mechanisms for the relationship of the enterprise with debtors and creditors. A comparative analysis of the hypothetical dynamics of the

values of sales volumes for a high-tech enterprise becomes an instrument of sound correction of its functional strategies (marketing, production, financial, etc.).

At the level of a high-tech enterprise, an applied automated information system implemented to support decision-making of economic problems covers a complex of mathematical and heuristic methods and models. They are based on uniform methodological and methodological approaches to the formation of a set of alternative options for managerial decisions, assessing the consequences of implementing each alternative and justifying the choice of the most appropriate managerial decision.

In the process of managing tasks in the economic activity of a high-tech enterprise, the system provides the generation of possible solutions to these problems, forming a list of alternative solutions. Assessment of possible alternatives is carried out based on the preferences of the decision maker taking into account the totality of restrictions formed by factors of the external and internal environment of a high-tech enterprise. The system should allow an analysis of the consequences of decisions made by the management of a high-tech enterprise, recommending the choice of the best solution.

As a rule, DSS of a high-tech enterprise are an interactive automated information system [7]. Such systems make it possible to efficiently use a combination of data and mathematical models in solving economic problems. Applied automated information system of a high-tech enterprise should be able to work with interactive queries, using a programming language that is not difficult to work with the system.

The functionality of the system should, firstly, allow the use of a combination of both data and models. Secondly, the system should help the management of a high-tech enterprise choose the best option when solving poorly structured and unstructured tasks. At the same time, DSS does not replace the development of solutions, but only provides their information support, increasing the validity and reliability.

DSS of a high-tech enterprise accompanies the various stages of the development and decision-making process, including the intellectual stage, as well as the stage of designing the totality of decisions and the stage of choosing the best option. Moreover, the system must support various styles and development methods, both interdependent and sequential solutions. For a high-tech enterprise, this system requirement becomes especially relevant in a situation when a group discussion of the decision is taking into account the previously obtained results in tasks with a low level of problem structuring.

The system must be flexible, i.e. to be able to adapt to changes occurring both in the internal environment of a high-tech enterprise and in the external environment. For high-tech enterprises that solve complex problems in the field of managing innovative projects (for example, innovative modernization projects with a high level of uncertainty in the final results), the ability to support the project management strategy modeling system with the system is an important characteristic. Moreover, the system should ensure that the management of a high-tech enterprise uses a wide range of explicit and implicit knowledge in various subject areas.

The system should be simple to use. This applies to both individual and group options for using the system. Modification of the system should be characterized by minimal costs of material, intellectual and financial resources. The need for such a modification may arise if new tasks appear in the economic activity of a high-tech enterprise, for example, tasks related to the robotization of production processes. This means that the system software must be able to support its evolutionary use, easily adapting to changing requirements.

The information platform of the applied automated information system that provides decision support for economic problems is the Data Warehouse. The combination of functional capabilities of DSS provides the formation of consolidated reporting, Online Analytical Processing (OLAP), the identification of hidden patterns Data Mining [3, 9], statistical analysis and forecasting of time series, as well as intelligent search for incomplete data and informal queries.

The organization of the instrumental environment of the applied automated information system that provides decision support for economic problems is based on open standards. Such standards constitute a publicly available technical specification that is not secret and does not have a specific copyright holder. Focusing on such standards, these systems must meet the requirements of information security, scalability, openness, multidimensional and multivariate data presentation. It is desirable that the system has an intelligent interface, the ability to integrate with the main platforms of the enterprise and the business applications used. Also requires the integration of data from a variety of sources, network integration. This primarily relates to Web integration [5, 8].

Information support of the decision-making process is based, firstly, on the algorithmization of the processes of developing management decisions, and secondly, on the formalization of the recommendations methods issued by the system. Formalization of methods for generat-

ing solutions, their evaluation and coordination of the results obtained belong to the class of difficult to solve problems. Using a high-tech enterprise applied automated information system that provides support for decision-making of economic problems, allows you to effectively solve such problems without losing the accuracy of the decisions.

The creation of an applied automated information system that provides decision support for economic problems is based on a number of principles. First, the information system, performing the necessary calculations, calculates the characteristics of potentially acceptable options for management decisions, and the decision is made by the manager of a high-tech enterprise. Secondly, the system should be invariant with respect to the level of information qualification of the user, i.e. Designed so that almost any user can work with the system. The third principle assumes that the system minimizes the flow of information by issuing only the information that the user needs to make a decision within the framework of a specific economic task.

In describing the subject area, the system should focus on the tools of object-oriented modeling. To ensure the effective functioning of the system, a high-tech enterprise must have a single information space, into the structure of which various enterprise information systems must be integrated. At the same time, it is advisable to design an information data warehouse using the decentralized principle of data storage.

From the point of view of the effective functioning of a high-tech enterprise, the architecture of applied automated information systems of the enterprise becomes an important factor. As applied to systems providing decision support for economic problems, a generalized system architecture was proposed by G.M. Marakas [6]. It covers the data management system (DBMS), the model management system (MBMS), the knowledge engine (KE) and the user interface (UI). According to N. Prokopenko [7], the DSS structure covers data sources and models, a model database and a software component. In turn, the software component consists of database management systems (DBMS), model database (SMS) and the interface between the user and the computer. Data sources can be external or internal. The base of models is formed at different levels of management of a high-tech enterprise, including strategic, tactical and operational levels.

Considering the classification of systems that provide support for decision-making of economic problems, passive and active systems can be distinguished. A system will belong to the class of passive systems if it simply supports the decision-making process without generating

proposals for a specific decision. When using active systems, the user receives recommendations from the system on making a specific decision. In addition, an active DSS allows the management of a high-tech enterprise to change the solutions proposed by the system, for example, to improve them. The user sends the changed solution to the system for verification. The system corrects the decision received from the user and sends a new solution to the user. The process continues until a solution is agreed between the user and the system.

The use of applied automated information systems allows a high-tech enterprise to effectively achieve both tactical and strategic goals of its competitive strategy. So, in the field of current activity, applied automated information systems that provide support for decision-making of economic problems make it possible for the management of a high-tech enterprise to quickly respond to changes in financial and economic processes. First of all, this concerns those changes that are critical for a high-tech enterprise in terms of the impact on the efficiency of solving current economic problems. Such critical deviations, for example, may be a decrease in the value of net working capital and current solvency below standard values, a reduction to the breakeven point of the dynamics of the formation of net revenue from product sales, etc.

These systems reflect sets of reports that are generated on the basis of data obtained from the transactional information system of the enterprise. Such reports should adequately reflect in real time the main aspects of the production and financial activities of a high-tech enterprise. Reports are usually based on standard requests for the enterprise; the number of which is small. The system presents reports in a user-friendly form, including a set of tables, business graphics, multimedia capabilities, etc.

At a strategic level, applied automated information systems that provide support for decision-making of economic problems focuses on the analysis of significant amounts of heterogeneous information collected from various sources. The most important goal of using applied automated information systems that support decision-making of economic problems at the strategic level of management is the search for the most rational options for the development of a high-tech enterprise. When choosing an enterprise development strategy, the system should allow the management of a high-tech enterprise to take into account the influence of factors such as the situation of target markets for product innovations for the enterprise, the dynamics of changes in financial and capital markets, changes in legislation, etc.

The system performs a deep study of the data, transforming them into a form convenient for use in the decision-making process. An integral component of the system used at the strategic level of high-tech enterprise management is decision-making rules. Such rules allow the management of a high-tech enterprise, using a combination of aggregated data, to make informed decisions in the field of project management, implementation of the enterprise modernization strategy, etc. Ultimately, the use of high-tech enterprise DSS at the strategic level of management provides a steady increase in the fundamental value of the enterprise, reducing innovative and investment risks. The construction of DSS used at the strategic level of managing a high-tech enterprise is focused on the technologies and principles of multidimensional representation and Online Analytical Processing (OLAP) [3], which allow modeling, searching and processing of data and their analysis.

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BLOCKCHAIN AND ITS APPLICATION TO KAZAKHSTAN'S CUSTOMS: A COMPARATIVE STUDY

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The article discusses some aspects of the introduction of blockchain technologies in the activities of the customs authorities of Kazakhstan in order to increase the efficiency of ensuring the release of goods. These technologies will improve the quality and speed of processing customs documentation, the reliability of the information, the safety and confidentiality of data. Also, this article discusses the experience of implementing blockchain technologies in the customs authorities of some countries and the implementation of blockchain technologies in the logistics business.

Keywords: blockchain; technologies; custom activity; customs service; customs; customs authorities; document management; database; single window.

The message of the President of the Republic of Kazakhstan, entitled «Third Modernization of Kazakhstan: Global Competitiveness» dated January 31, 2017, focuses on the development of digitalization of various sectors of the economy. In this message, was announced the program «Digital Kazakhstan». The objectives of the state program are to accelerate the development of the economy of the Republic of Kazakhstan and improve the quality of life of the population through the use of digital technologies in the medium term, as well as creating conditions for the transition of Kazakhstan's economy to a fundamentally new development trajectory ensuring the creation of a digital economy of the future in the long term.[1] This program makes a correction to the work of all state bod-

[1]Section 1 of the Decree of the Government of the Republic of Kazakhstan dated December 12, 2017 No. 827 "On approval of the State program "Digital Kazakhstan"".

ies of the Republic of Kazakhstan.

Over the 28 years of its independence, Kazakhstan has undergone major changes in the field of legislation and public service. Kazakhstan is a full-fledged participant in many international organizations and has ratified quite a large part of international agreements concerning the designation of public services. Currently, more than half of public services are carried out on the principle of «Single window»[2] and use digital technologies in their work. Customs authorities are also no exception.

In June 2018, the World Customs Organization (WCO) released a research paper entitled «Unveiling the Potential of Blockchain for Customs».[3] This document discusses the possibility of introducing blockchain technology into the customs authorities. According to experts, this technology can lead to an improvement in «Trade facilitation, and fraud detection».[4]

Blockchain is a method of storing data or a digital register of transactions, contracts and other information. In the database, the records are combined into blocks, which are then linked cryptographically and chronologically into a chain using complex mathematical algorithms, thus creating a distributed trust network.[5]

For the best use of blockchain technology, you first need to clarify the term blockchain. The term «blockchain» is a combination of «block» and «chain»: where, block denotes a series of records (financial or non-financial) about transactions, for example: records which include the ownership of physical assets (goods, raw materials); and a «chain» connecting the components of these records, having a hash function. Using data «chains», any data of arbitrary size can be converted to data of a fixed size with a different format (hashes). Then a transaction is created and it is confirmed by a group of people.[6]

Blockchain technology is the ecosystem in which miners work, they confirm transactions, then there is a process of matching with the previ-

[2]According to subparagraph 2 of Article 1 of the Law of the Republic of Kazakhstan «On Public Services», the principle of «single window» is a form of centralized public service providing for the minimum participation of the service recipient in collecting and preparing documents in the provision of public service and restricting his direct contact with service providers.

[3]Yotaro Okazaki, «Unveiling the Potential of Blockchain for Customs» (2018) WCO Research Paper № 45 <http://www.wcoomd.org/-/media/wco/public/global/pdf/topics/research/research-paper-series/45_yotaro_okazaki_unveiling_the_potential_of_blockchain_for_customs.pdf?la=en> accessed 18 May 2019.

[4]Ibid., 2.

[5]Bikramaditya Singhal, Gautam Dhameja, and Priyansu Sekhar Panda, *Beginning Blockchain* (Apress 2018) 8.

[6]Okazaki (n 3), 6.

ous record. The whole process aims to ensure the consistency of all existing data in the chain of digital blocks. Next, information is exported to a virtual block with a limited recording capacity, while the «nodes» check all transactions (and hashes), returning to each of the previous blocks.[7]

The first example of the use of blockchain technology was demonstrated in the first cryptocurrency called «Bitcoin». It is believed that the creator of the blockchain technology is someone whose pseudonym is Satoshi Nakamoto, an unknown person or group of individuals who created Bitcoin.[8]

Blockchain Applications:

Smart contract: The process of entering into any transaction is primarily the drafting of a contract in which all the conditions, rights and obligations of the parties involved are specified. However, in most of the contracts there are not only the parties to the agreement, but also intermediaries – banks, notaries, registrars, regulators. Due to the active development of blockchain technology, this need is a thing of the past – the so-called «smart» contracts have been replaced by ordinary contracts.

A smart contract is an algorithm designed to automate the process of executing contracts. In simple terms, this is a set of rules and a sequence of actions for execution. These rules are stored to discuss the terms of the contract, then automatically checked, and then the conditions fulfilled according to the digital protocol.[9]

«Vending Machine» is a good example of the concept of a smart contract. The principle of operation is quite simple. Located buttons indicate the product and its cost, then when you click on one of them put a condition on payment. After receiving the money, the automated system recognizes the value of money. After receiving the money, the goods are issued.[10]

Consider the principle of the operation of a smart contract in the example of an ordinary commodity transaction. Suppose you want to buy a laptop on the online trading platform from a person from another city (domestic trade) or country (international trade). The problem is that you do not have the opportunity to see reviews of the goods, and the seller urgently asks for prepayment. Prepayment is needed because the seller is afraid that if he sends the package on delivery, you will not take it, and he will lose money for shipping back and forth. You, for your part, are afraid that the seller will turn out to be a fraud, will appropriate your money and

[7]Ibid., 6.

[8]Singhal, Dhameja and Panda (n 5), 149.

[9]Ibid., 253-254.

[10]Okazaki (n 3), 7.

will not send the goods or will not send what you need.

A programme has been developed to reduce the risk. This programme monitors the fulfillment of the obligations of both parties specified in the contract, and also automatically collects fines for violation or failure to comply with the terms of the transaction. Smart contracts provide security for the transaction and are free from the ambiguous interpretation of conditions due to the fact that they are based on cryptography. These are more lucrative deals in material terms, since a person does not need to pay lawyers, intermediaries.[11]

The elements of a smart contract are the following objects:

- The subject of the contract. The programme must have access to the goods or services about which the contract is concluded, and be able to automatically give or close access to them;[12]
- Terms of agreement. Conditions of a smart contract are in the form of an exact sequence of operations.[13] All participants in the contract, in our example, the buyer and seller, must sign these conditions. Digital signatures are used to sign the contract.[14] All participants initiate an agreement by signing the contract with their secret keys;
- Decentralized platform. A smart contract is recorded in a block of a circuit and distributed, then stored on its nodes.[15]

Based on the considered example of the use of a smart contract, it can be concluded that the advantages of smart contracts are sufficient. The main ones are as follows:

Security. The smart contract is encrypted and stored on multiple devices, which guarantees protection against loss or unauthorized changes;[16]

Cheapness and speed. Most processes are automated,[17] and most intermediaries are eliminated from the process;[18]

- Standardization. Today there are many options for smart contracts, and you can choose the right one for a specific task.[19]

[11]Ibid., 10.

[12]Anastasia Osmolovskaya, “Smart Contracts: Functions and Applications” (2018) 2 Business Education in the Economics of Knowledge 54 < https://cyberleninka.ru/article/n/smart-kontrakty-funktsii-i-primenenie> accessed 18 May 2019.

[13]Jake Frankenfield, «Smart Contracts» (Investopedia, 26 April 2019) <https://www.investopedia.com/terms/s/smart-contracts.asp> accessed 18 May 2019.

[14]Okazaki (n 3), 6.

[15]Singhal, Dhameja and Panda (n 5) 55, 62.

[16]Okazaki (n 3), 10, 12.

[17]Ibid., 8.

[18]Ibid., 7.

[19]Singhal, Dhameja and Panda (n 5) 208.

- However, smart contracts have significant drawbacks:
- Security: The human factor. Since a contract is a code written by people, there may be some errors in it. In addition, the smart contract is recorded in the blockchain – it means it cannot be changed. A good example of such a mistake is the story of the project The DAO.[20] The developers' mistakes were costly for both users and companies. Hackers took advantage of the vulnerability and stole about $ 60 million;[21]
- Uncertain legal status. Today, smart contracts are not subject to government regulation, so if government bodies decide to create a legal framework for smart contracts, there may be serious restrictions;[22]
- The cost of implementation. Smart contracts are meaningless without programming, and in order to create a reliable smart contract that reflects the needs of the company, it is advisable to have an experienced developer on the staff.[23]

Business view:

The technology giant represented by IBM and the largest container shipping company Maersk in early 2018 launched a large-scale blockchain project for the transportation of goods from Europe to the USA.[24] However, these testing technologies in the field of large logistics can only be considered as a pilot, but already having the full right to implement.

The main goal of this project is to create a digital trading platform, built on open standards and designed to be used by the entire global ecosystem of cargo delivery. As part of the partnership, IBM provides solutions such as artificial intelligence, analytical tools and the 'Internet of things', «Big Blue» cloud service and other systems. Maersk for its part provides expertise in the field of trade and logistics.[25]

In August 2018, a joint blockchain platform called «TradeLens» was created. Thus, the participants in any transaction on this platform receive certain advantages, such as tracking cargo and deliveries in real time, which has long been a weak point of the global freight industry, to refuse paper clearance of cargo and customs. At this stage, certain agreements have been reached between the project participants, for example:

- more than 20 ports and terminals worldwide, for example: PSA

[20]A digital decentralized autonomous organization representing a crowdfunding platform based on the system of smart contracts and 'Ethereum' technology.

[21]Michael del Castillo, «The DAO Attacked: Code Issue Leads to $60 Million Ether Theft» (Coindesk, 17 June 2016) <https://www.coindesk.com/dao-attacked-code-issue-leads-60-million-ether-theft> accessed 18 May 2019.

[22]Osmolovskaya (n 12), 55.

[23]Okazaki (n 3), 9.

[24]Ibid., 13-14.

[25]Ibid., 14-15.

Singapore, International Container Terminal Services Inc, etc.

- Customs authorities in the Netherlands, Saudi Arabia, Singapore, Australia.
- freight forwarders, shipping and logistics companies, such as Agility, CEVA Logistics, DAMCO, etc.[26]

Customs authorities view:

The customs authorities at the same time have the opportunity to see the goods online and have better information for risk assessment and the decision to conduct additional customs control. Each participant in the supply chain sees the movement of cargo at each stage and understands the location of the container at the moment. Participants in the process can also see the status of customs documents, bills of lading and other data.

The United States of America. Currently, the Consultative Committee of the US Customs and Border Protection Service[27] is studying the possibility of using blockchain technology as part of its activities. According to the report, in September 2017, a working group was established that deals with the use of distributed blockchain technology and its use in trade. The report states that the group demonstrated 14 options for the use of blockchain technology in the customs field. For example, collecting and tracking data such as: licenses, permits, certificates of origin, customs licenses, etc.[28]

The United Kingdom. At the beginning of 2016, a report titled was published in the UK «Distributed Ledger Technology: beyond block chain» – a study conducted by The Government Office for Science. The report states that the main task of the state is to develop a specific concept of how blockchain technology can contribute to improving business processes of state bodies and what forms of its use in providing services to citizens.[29]

David Davis, the British exit minister from the European Union, announced that by 2019 a new customs system would be created. Com-

[26]TradeLens, «The TradeLens Solution» (TradeLens, 2019) <https://www.tradelens.com/solution/> accessed 18 May 2019.

[27]The Federal law enforcement Agency of the United States Department of Homeland Security, responsible for issues in the customs and border control.

28US Customs and Border Protection, «COAC Quarterly Meeting» (US Customs and Border Protection, 23 January 2018) <https://www.cbp.gov/trade/stakeholder-engagement/coac/coac-public-meetings/coac-quarterly-meeting-november-14-2017-washington-dc> accessed 18 May 2019.

[29]Mark Walport, *Distributed Ledger Technology*: *beyond blockchain* (Crown copyright 2016) UK Government Office for Science, 9 <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492972/gs-16-1-distributed-ledger-technology.pdf> accessed 20 May 2019.

panies that rely on high-traffic routes on the Irish border and canal ports, such as Dover, are concerned that new bureaucratic measures will cost both time and money as they continue to interact with EU member states. Blockchain technology offers the best way to record customs data so that it can be shared safely with several participants in the supply chain. The marine supply chain has already shown that blockchain can significantly reduce associated administrative costs and time delays.[30]

Republic of Korea. In May 2017, Samsung SDS, a division of Samsung, led the Korean blockchain consortium, which included logistics companies and government research centers in Korea. Among the members of the consortium created to study the use of blockchain in the field of logistics is the Korean Customs Service. During logistic processes, blockchain technology can effectively manage the history of production, processing, storage and transportation of goods, which prevents fraud associated with changes in the distribution period and false advertising. Thanks to the blockchain, you can also track in real time the current position of the cargo. According to Korean customs officers, the blockchain is able to simplify the customs clearance of companies and reduce logistical costs.[31]

The United Arab Emirates. One of the first cities in the world that supported the blockchain at government level was Dubai. Dubai Customs will cooperate with the American company International Business Machines. It is planned that the blockchain will reduce the amount of customs documentation, which still accompanies the transportation of goods, as well as allowing their suppliers and recipients to monitor all processes in real time.[32]

Thus, the study of foreign experience in the use of blockchain technology in foreign countries suggests that the above-mentioned countries are introducing technology in various fields, including customs. The countries interact with each other, organize joint projects on the implementation of technology at the state level. These examples show that blockchain technology has advantages and will continue to be implemented in the work of customs authorities. The study of international experience contributes to the understanding of the current prospects for the development of block-

[30]Lewis King, «UK traders say blockchain can ameliorate impending customs congestion» (Aircargoworld, 16 August 2017) <https://aircargoworld.com/allposts/brexit-secretary-says-blockchain-can-ameliorate-impending-customs-congestion-2/> accessed 20 May 2019.

[31]Forknews, «Samsung SDS will create a blockchain system for customs clearance» (Forknews, 15 September 2018) <https://forknews.io/blockchain/002292-kompaniya-samsung-sds-soz.html> accessed 20 May 2019.

[32]Los Silva, «IBM Launches Blockchain Initiative With Dubai's Government» (ETH News, 8 February 2017) <https://www.ethnews.com/ibm-launches-blockchain-initiative-with-dubais-government> accessed 20 May 2019.

chain technology in Kazakhstan's customs authority.

Legal Frameworks from a Comparative Perspective

In November 2017, the International Bar Association published a report on blockchain and cryptocurrency, their legal regulation today and in the future. Key points of the report are as follows. This report gives the concept and legal regulation of the blockchain.[33]

The process of financing trade transactions, lending, including export, letters of credit, factoring, insurance, including the participation of many parties can be simplified, and the risks of fraud, forgery, etc., associated with multi-stage transactions reduced thanks to blockchain technology. The lack of uniformity in the legislation of the states regulating these areas was emphasized in the reviews of the International Chamber of Commerce in 2016, 2017. Spanning legislation increases the cost of cross-border transactions and leads to their complication. The use of the blockchain would make it possible to establish uniform trade standards and reduce costs.[34]

At this time, there is no unified legal framework for regulating blockchain technology in the countries of the Eurasian Economic Union, but there is an approved programme in which the emphasis is on developing digital technologies that enhance the potential of the digital industry transformation: 3D modeling and prototyping, cloud computing and cloud infrastructures, blockchain technologies (including smart contracts), big data and analytics, augmented and virtual reality, artificial intelligence, digital B2B (business to business) and B2C (business to consumer) platforms.[35]

Also in the European Union, attention is being paid to the introduction of blockchain technology in various business sectors. According to a European Parliament resolution of 17 May 2017 on FinTech: the influence of technology on the future of the financial sector, «Underlines the potential of blockchain applications for cash and securities transfer, as well as facilitating «smart contracts», which open up a wide range of possibilities for both sides of financial contracts, in particular trade finance and

[33]Gabrielle Patrick and Anurag Bana, «Rule of Law Versus Rule of Code: A Blockchain-Driven Legal World» (2017) International Bar Association Legal Policy & Research Unit Legal Paper 5. <https://www.ibanet.org/LPRU/Disruptive-Innovation.aspx> accessed 20 May 2019

[34]Ibid., 33-34.

[35]Section IV (9)(з) Order of the Board of the Eurasian Economic Commission dated October 30, 2018 No. 166 “On the draft recommendation of the Council of the Eurasian Economic Commission“ On the Concept of creating conditions for the digital transformation of industrial cooperation within the framework of the Eurasian Economic Union and the digital transformation of industry of the Member States of the Union”.

business lending arrangements, which have the possibility to simplify complex commercial and financial contractual relationships at business-to-business (B2B) and business-to-consumer (B2C) levels; stressing that blockchain platforms are also suitable for the simplification of complex B2B and B2C transactions».[36]

One of the first countries to legally enshrine blockchain technology is the United States. Thus, in the Senate Bill of Washington,[37] the official definition of the term «Blockchain» and «Distributed ledger technology» is given. According to this law:

- «Blockchain» means a cryptographically secured, chronological, and decentralized consensus ledger or consensus database maintained via internet, peer-to-peer network, or other similar interaction.[38]
- «Distributed ledger technology» means any distributed ledger protocol and supporting infrastructure, including blockchain, that uses a distributed, decentralized, shared, and replicated ledger.[39]

The legislature also encourages development in the field of blockchain technology.[40]

At this stage, the Government of Kazakhstan intends to develop the potential of blockchain technology in all possible industries. According to the Resolution of the Government of the Republic of Kazakhstan, on the approval of the State Program «Digital Kazakhstan», special attention is paid to the development of blockchain technology. Thus, this programme envisages the development of projects based on blockchain technologies in public service, medicine, and business. Also, in this document the official definition of the blockchain term is given - keeping in electronic form in chronological order a single public record of any data and (or) committed actions by all participants of any business network.[41]

At the beginning of 2018, the National Plan for the Implementation of the President of Kazakhstan's address to the people of Kazakhstan was approved under the title «New Development Opportunities in the Fourth Industrial Revolution».[42]

[36]European Parliament Resolution On FinTech: the influence of technology on the future of the financial sector [2017] OJ, C307/57 para 37.

[37]5638 Substitute Senate Bill on «Recognizing the validity of distributed ledger technology».

[38]Ibid., Section 2 (1).

[39]Ibid., (2).

[40]Ibid., (3).

[41]Section 2.2 (n 1).

[42]Para 1 On measures to implement the Message of the Head of State to the people of Kazakhstan dated January 10, 2018 "New development opportunities in the context of the

According to which, special attention was paid to improving the efficiency of the country's transport and logistics infrastructure. Thus, by the end of 2020, the task was to study and ensure the introduction of modern technologies, such as blockchains and big data analysis, to monitor goods online and simplify customs procedures for the customs authorities of the Republic of Kazakhstan. Responsible government agencies, such as the Ministry of Finance, the Ministry of Industry and Infrastructure Development, the Ministry of Information and Communications, and representatives of large business communities have signed agreements on cooperation and further development.[43]

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ATTITUDE TOWARDS MIGRANTS AND TOLERANCE OF UNIVERSITY STUDENTS

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In the context of globalization, the problems of interethnic, interfaith relations are aggravated, which require well-considered decisions of the state and society. Untimely response to these problems and negative moods in society regarding migrants tend to develop into nationalist ones, which are fraught with already more serious consequences. Under these conditions, it is extremely important to analyze the state of tolerance in society in relation to migrants, especially among young people. The article discusses the results of a study among university students in order to identify a tolerant attitude towards migrants. For comparison, we used the results of a study by the American Institute of Public Opinion Gallup. It was found that the average level of tolerance among Russian university students is significantly lower than the Global Migrant Acceptance Index. This fact indicates an unfavorable state in society and the severity of the problem of relations with migrants. Based on the results of the study, measures were proposed aimed at creating a tolerant consciousness in society, creating an atmosphere of friendly relations between indigenous people and migrants, representatives of different nationalities.

Keywords: migrant, tolerance, intolerant attitudes towards migrants, Migrant Acceptance Index.

Introduction

Currently, there is an increase in migrant flows in different countries of the world. The processes of globalization exacerbate the problems of interethnic, interfaith relations, which require their resolution by the state and society [1,2]. Untimely response to these problems, an intolerant attitude towards migrants in society can have dire consequences in the form of nationalist sentiments [3,4], especially among young people

[5,6,7]. In 1995, UNESCO adopted the «Declaration of Principles of Tolerance», which aims to establish the foundations of respect for human rights and fundamental freedoms for all without distinction on the basis of race, language, nationality, religion [8]. In article 1.1. The Declaration defines tolerance: «Tolerance is respect, acceptance and appreciation of the rich diversity of our world's cultures, our forms of expression and ways of being human. It is fostered by knowledge, openness, communication, and freedom of thought, conscience and belief. Tolerance is harmony in difference. It is not only a moral duty, it is also a political and legal requirement. Tolerance, the virtue that makes peace possible, contributes to the replacement of the culture of war by a culture of peace» [8, p. 2]. In article 1.3. The declaration states: «Tolerance is the responsibility that upholds human rights, pluralism (including cultural pluralism), democracy and the rule of law. It involves the rejection of dogmatism and absolutism and affirms the standards set out in international human rights instruments» [8, p.2]. Failure to comply with the principles of tolerance can lead to incitement of ethnic hatred, ethnic and religious conflicts, and open confrontation.

According to a 2017 report by the United Nations «Trends International Migrant Stock» [9], Russia ranks fourth in the world after the United States, Germany and Saudi Arabia in terms of the number of migrants. Every year, millions of labor migrants from Ukraine, Uzbekistan, Tajikistan, Kyrgyzstan, Moldova, Azerbaijan, China, Afghanistan, Vietnam, and Turkey come to Russia to earn money [10]. The issue of adaptation of labor migrants to new living conditions is one of the main ones. According to the Organization for Economic Cooperation and Development (OECD), in 2010 Russia among 42 countries took 39th place in the index of tolerance towards national minorities [4]. According to the Levada Center public opinion poll [11], the attitude of Russian residents towards migrants has worsened over the past 10 years: 32% of respondents believe that migrants are poorly educated people capable of only unskilled labor, only 28% expressed such an opinion ten years ago interviewed. The number of respondents who believe that migrants are hardworking people who are willing to work hard has decreased from 30% to 26% [11]. At the same time, the number of Russians who consider labor migrants the breadwinners of their families who are ready for any hard work for the sake of their loved ones has decreased from 38% to 25%. The majority of respondents (67%) believe that the government needs to limit the flow of migrants to Russia, in March 2016 this opinion reached a maximum of 80% of the total number of respondents [11].

The results of our previous study conducted in 2017 among students of Siberian universities confirmed the general tendency towards migrants in Russia. In the Novosibirsk region there are many representatives of various nationalities. According to the data of the Federal State Statistics Service for the Novosibirsk Region, the majority of those who arrived in the region are migrants from Central Asia (84%) [10]. There are citizens of Uzbekistan, Tajikistan, Kyrgyzstan and Kazakhstan.

The total number of arrivals in 2017 is 86,300 people [4], more than half of them were labor migrants and young people who arrived for educational purposes. Since quite a lot of young foreigners come to get an education, the study was carried out among university students, the sample was 345 people. In general, the survey results showed a rather negative attitude towards migrants among students: 62.7% of students are concerned about the "situation with an increase in the number of non-Russians." The students indicated the following as grounds for concern:

1) Migrants do not want to obey the norms of behavior in a civilized society - 43.5%;

2) Migrants do not have an elementary culture of behavior - 41.3%;

3) Migrants should not control certain areas of business (for example, trade) - 37.4%;

4) Migrants take away jobs from indigenous citizens - 28.2%;

5) Migration crime is growing - 25.1%;

6) Migrants marry Russians and “purebred” Russians are becoming less and less - 13.7%;

7) Migrants speak their own language among themselves, do not speak Russian well - 11.9%;

8) Rejection of migrants: «Russia for Russians» - 6.3%.

Those students who have a higher level of material security worry about cultural differences, they fear the possibility of terrorist acts due to the large number of migrants. Poor students worry about jobs and business control. There is a clear tendency towards xenophobia and ethnic intolerance. Half of the students happened to witness ethnic intolerance towards representatives of non-indigenous nationalities (53.4%), which was expressed in verbal abuse (72.7%) and humiliating hints (42.3%), in the form of physical violence - 40.2% [12, p. 1915].

Only a quarter of the respondents (25.7%) will stand up for a person who is insulted due to national and religious affiliation, 31.3% will not intervene and 3.1% said they would support the attackers, and 43.5% could not answer this question and would do according to circumstances. The results obtained, students' statements demonstrate a fairly low level of tolerance.

Purpose of the study

The growing trend of rejection on its territory of representatives of other countries and other nationalities leads to conflict situations among students and migrants who came to study in Russia. The purpose of this work is to study the level of tolerance to migrants among university students, compare with global indicators [14, p.332-334] and develop measures and proposals for the formation of friendly good neighborly relations based on the principles of tolerance.

Method

In 2017, the American Institute of Public Opinion (Institute of Gallup) conducted a survey in 138 countries around the world to study the tolerant attitude towards migrants and compiled a rating of positive and negative attitudes towards migrants [15]. During the study, an average tolerance index was determined: the global Migrant Acceptance Index was 5.29. Results above the world average index were recorded in 77 countries, in other countries (61 countries) the index was below average.

The most intolerant towards migrants were residents of nine countries of Eastern Europe and Israel [15, p. 4].

1. Macedonia - 1.47
2. Montenegro - 1.63
3. Hungary - 1.69
4. Serbia - 1.80
5. Slovakia - 1.83
6. Israel - 1.87
7. Latvia - 2.04
8. Czech Republic - 2.26
9. Estonia - 2.37
10. Croatia - 2.39

The most friendly towards migrants country were Iceland (index 8.26) and New Zealand (index 8.25). A high level of tolerance was shown by residents of Australia (index 7, 98), Sweden (index 7.92), Ireland (index 7.74). Russia is among the 15 most intolerant countries in relation to migrants, took 14th place from the end (with an index of 2.60) from 138 countries where the study was conducted [15, p.5].

Gallup created the Migrant Acceptance Index to gauge people's acceptance of migrants based on increasing degrees of personal proximity. The index is based on three questions that Gallup asked in 138 countries in 2016 and the U.S. in 2017.

Gallup suggested using Migrant Acceptance Index Questions:

1) Immigrants living in this country (A good thing, A bad thing, It depends, Don't know/Refuse)

2) An immigrant becoming your neighbor (A good thing, A bad thing, It depends, Don't know/Refuse)

3) An immigrant marrying one of your close relatives (A good thing, A bad thing, It depends, Don't know/Refuse).

The answer «A good thing» was assigned 3 points, the answer «I don't know» / «It depends on ...» was awarded 1 point, and the answer «A bad thing» was assigned 0 points. The maximum amount for the survey can be scored 9 points for respondents who answered the «A good thing» to three questions. The minimum amount of 0 points for respondents who answered three questions is a «A bad thing».

In 2019, a study was conducted using a questionnaire created by the American Institute of Public Opinion Gallup [15] among students of Russian universities of law faculties. It was assumed that law students who learn to defend human rights were expected to be highly tolerant. The sample was 75 people.

Results

Out of 75 people, 24 respondents (32%) answered «I don't know» to all three questions, scored three points each. This fact indicates that their opinion on the problem in question was not determined, and therefore it is necessary to carry out pedagogical work on the formation of friendly interethnic relations in the student community. Five people (6.6%) replied: «Depends on the country from which the migrant arrived». The most disrespectful are migrants from Central Asia and the Caucasus. This fact is consistent with the results obtained by the Levada Center [11]. Three people (4%) replied: «Depends on which person is good or bad, and this is not related to nationality». Five respondents (6.6%) showed extreme rejection of migrants: all three questions were answered that migrants are bad, and eight respondents (10.6%) said that migrants are good, and scored a maximum amount of 9 points. Most of the respondents (43 students) to the question «Migrants in our country is a good thing / a bad thing / I don't know» answered «I don't know». This amounted to 57.3% of respondents. More than half of the students did not determine their attitude to migrants, therefore there is an opportunity in pedagogical work to fill this gap in the education of students. It is necessary to cultivate good interethnic relations, ethnic tolerance. Extremely negative attitudes towards migrants appeared in 12 people (16%), they claimed that migrants in Russia are a bad thing. Only 20 students (26.7%) stated that migrants are a good thing for the country. Only 16 people (21.3%) agreed with the

statement that a migrant who became a neighbor is a good thing. But 10 students (13.3%) claimed that a migrant neighbor is a bad thing. 24 people (32%) would not want a migrant to become a member of a family with someone from close relatives under any circumstances, and only 11 people said that a family with a migrant is good (14.7%).

When we compared the results of our study with the results of the Gallup Institute, we found that the attitude towards migrants in the world is more friendly than in Russia. For example, 50% of respondents in the world said that a migrant in the neighborhood is good, but in our study only 21.3% of respondents positively assessed the fact of being a migrant. To the question «Is it good if your close relative creates a family with a migrant» 44% of respondents in the Gallup Institute study said that this is good, but in our study there were only 14.7% of such positive-minded respondents. Russian students do not want to accept migrants in the immediate environment.

When analyzing the answers to each question separately, we found a manifestation of inconsistent positions among the same respondents. For example, there are students who claimed that migrants are good. But these same students did not want the migrants to be their neighbors (8%), especially their close relatives (14.6%). These facts indicate latent intolerance and xenophobia, unwillingness to see migrants in the immediate environment. The approval of migration processes in general, regardless of the personal interests of students, is evaluated positively. But, if the problem of migration concerns the sphere of personal relations, it causes a pronounced intolerance towards migrants.

Acceptance Index score in the world is 5.29, in Russia 2.60, in our study among future lawyers - 3.66. At first glance, the situation among young people looks better than the national average. But if we take into account latent intolerance, then the tolerance index will decrease significantly and amount to 2.44, which is lower than the average index in Russia.

Conclusion

The results of our study showed the existence of a problem of ethnic intolerance among young people, which violates the principle of equality of nationalities from the standpoint of law. Our country is a multinational state; more than 180 nationalities live in Russia [17]. The development of tolerance and respect not only for migrants, but also for small nations is one of the important tasks of modern society. The low level of tolerance in Russia is associated, in our opinion, with insufficient attention to the problem of interethnic relations in educational institutions: schools, col-

leges, universities. Changing the state of affairs in the field of interethnic relations, increasing the level of tolerant consciousness of youth depends a lot on pedagogical efforts. Article 4.1 of the «Declaration of Principles on Tolerance» explicitly refers to the role of education in shaping tolerance: « Education is the most effective means of preventing intolerance. The first step in tolerance education is to teach people what their shared rights and freedoms are, so that they may be respected, and to promote the will to protect those of others». Article 4.4 states: «This means devoting special attention to improving teacher training, curricula, the content of textbooks and lessons, and other educational materials including new educational technologies, with a view to educating caring and responsible citizens open to other cultures, able to appreciate the value of freedom, respectful of human dignity and differences, and able to prevent conflicts or resolve them by non-violent means». Educational policy and programs should help to improve mutual understanding, strengthen solidarity and tolerance in relations between individuals and between ethnic, social, cultural, religious and linguistic groups. Practical steps to solve this problem by educational methods can be the development of the state program "Russia is a country of ethnic equality", including legal, political, cultural, educational components. The development of tolerance is a common affair of many state and public institutions. Particular attention should be paid to the training and retraining of professional specialists. Tolerance is necessary for the teacher or professor himself. [19]. It is very important who will change the worldview, ideology, who will cultivate humane values among young people, who will instill tolerance. We also propose the inclusion in the standards of higher education of the discipline «Fundamentals of Tolerance». This proposal is due to the new requirements of society. Currently, a specialist in any field of activity needs competencies associated with the manifestation of interethnic tolerance in a multinational world.

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NETWORK ONTOLOGY AND MULTIPLE SUBJECTIVITY

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The article is devoted to network ontology: the authors analyze various types of networks that appeared on the basis of discoveries in elementary particle physics.

From the authors' point of view, the network is similar to a maze, the variants of which were analyzed by U. Eco. A network is similar in its characteristics of multiple subjectivity: it also contains the principles of the center and periphery, the properties of the network: flexibility, scalability, survivability, relations, rather than elements, also dominate. One of the first network thinkers, the authors consider the Danish philosopher S. Kierkegaard, who, using conceptual characters, expressed multiple subjectivity in philosophy.

Keywords: network ontology, multiple subjectivity, maze, identification, communication, Kierkegaard, Deleuze

Network ontology appears long before the advent of the Internet. The sixties of the XX century were a decade of discoveries in elementary particle physics, since the discoveries of new particles followed one after another.

In this regard, two elementary philosophies arose that interpreted what was happening differently. Jeffrey Chu (Berkeley) developed the so-called “bootstrap philosophy”, that is, “lacing philosophy”, then laid the foundation of transpersonal psychology by Stanislav Grof. Chu was a supporter of “nuclear democracy”: according to Chu, each particle has the right to be considered elementary, and there are no more fundamental particles and less fundamental in the whole ensemble, but hundreds of such particles were discovered, if they were all equally elementary, then not a single

one of them could not be considered elementary. In addition, for reasons of elegance, the initial may not be much.

An alternative was the quark model. S. Grof notes: "The Universe cannot be considered - as it happens in the Newtonian model and its derivative concepts - in the form of an ensemble of entities that are not amenable to further analysis and a priori data." [1]

This model assumes that nature does not reduce to elementary particles, to some fundamental entities. The Universe appears in the form of a network of endless, interconnected events, where nothing is fundamental, atomic, since the parts reflect the properties of other parts.

What turned out to be wrong with respect to the nature of elementarity turns out to be true with respect to the representation of knowledge about nature. Relationships are considered primary, which then determine entities. It can be assumed that network cognition is equivalent to movement in a maze.

Umberto Eco identified three types of maze. [2] The classic labyrinth, the one in Knossos, which Eco calls unicursal: if you enter it, you will not find the center, if you are in the center, then you will not find a way out if you enter it, you will not find the center, if you are in the center, you will not find a way out. If you expand this labyrinth, then we will have in our hands the thread of Ariadne, which in legend is represented by the path from the labyrinth, but in reality it is nothing more than the labyrinth itself. With the semiotic unfolding of this type of labyrinth, we have in our hands a tangled rope, that is, the labyrinth itself, and culturally, a memory of eternity, maternal origin and death.

The second type of labyrinth is the castle labyrinth or Irrweg (in German - “false path”). It offers an alternative choice, all his paths lead to a dead end, except for one leading to the exit. If you expand this labyrinth, then it will be a tree - a structure consisting of dead-end branches, except one. In such a maze, mistakes can be made, if they occur, then we have to return in our tracks. In a sense, the castle labyrinth is similar to a flow diagram that graphically depicts the steps of the process, which is convenient for exploring the possibility of improvement and possible sources of trouble.

The labyrinth of the third type is a network where the points are connected to each other. The labyrinth cannot be expanded, because the labyrinths of the first and second types have entry and exit points, but the labyrinth of the third type that goes to infinity has neither external nor internal parts, since the network point is connected to other points, and the network structure itself will be different than a minute ago.

A network is a maze that is constantly being rebuilt. This maze can be walked in different ways each time. One overcoming it must learn to constantly correct the idea that he develops, whether it is an idea of one of the local sections, or a regulating hypothetical idea that has a common structure that is not cognizable for synchronous and diachronic reasons.

Eco chose a rhizome as a metaphor for the network model. This is a book by G. Deleuze and F. Guattari, published in 1976. The authors distinguished between two types of crops - arboreal and rhizome culture. The first, mostly European, the second is the culture of the frontier, and in modern terms - the culture of mobile networks.

Network theory allows us to solve problems that are given with great difficulty for system theory. Its advantage is the flexibility of defining a network element: elements can change, but this fact is not a problem for network theory, since the components are nodes and relationships.

Symbolically, relationships can be represented in the form of channels in which various types of social activity occur through actors. On the Web, you can distinguish centers and peripheries, but these designations are dynamic and mobile, because their place in the network space is changing, and their social activity is changing. Thanks to a small number of definitions, network theory receives a kind of ideological neutrality, allowing it to be used by representatives of various theoretical schools. For example, Manuel Castells used it to forecast the development of the global world and the information society.

For social life, networks are communication structures that produce flows — the movement of information between network nodes. The network is defined by a program that sets the goals of the network, the rules of execution, which includes an assessment of performance, success criteria - failure. In social networks, actors create and program networks based on their own ideas about values and interests, and communicate with each other.

The main characteristics of such a network are flexibility, scalability, survivability:

Flexibility - the ability to reconfigure under changing conditions, bypass locking to search for new connections;

Scalability - the ability to change with the least loss;

Survivability - the ability to withstand attacks on the network. [3]

Networks are not a product of modern society. Networks construct a fundamental pattern of life. The web of life is a network within a network where a node turns out to be a smaller network. Traditionally, we perceive

the network as a hierarchical system, but nature does not know hierarchy. According to F. Kapra, the concept of a network has become "determining in the development of a scientific understanding of not only ecosystems, but also the very nature of life." [4]

The development of the Internet has given rise to the pluralization of lifestyles, including those that do not recognize social values, the ability to create one's own identity, generate multiple subjectivity, as a person can act in several realities, act in various social spheres. These spheres became permeable, and the interpenetration of these spheres became possible.

Consciousness is a "colony" of social cells insofar as networks transform processes that were once social into psychic. In such cases, consciousness works as an apprentice in social networks [5].

The greatness of the philosopher is determined by the fact that his legacy is read differently in different eras, finding a response in the minds of contemporaries. This is true for S. Kierkegaard. From an existentialist, his interpretation moved to the creator of conceptual characters and the theorist of multiple subjectivity, and therefore, to the understanding of S. Kierkegaard as a network thinker. The Danish philosopher can rightfully be called a network philosopher on the following grounds:

1. The network is the field of philosophizing for S. Kierkegaard - a form of human existence: aesthetic, ironic, ethical, humorous, religious.
2. The conceptual characters act as elements or nodes of the Network, each of which existentially embodies an idea, a passion, which can become the meaning of human existence.
3. Dialogue, communication are characteristic of conceptual characters: they argue with each other, agree, supplement, thereby identifying the verges and boundaries of the ideas that they embody, and draw the boundaries of other characters, thus S. Kierkegaard a kind of name-chain - the web, which connects all conceptual characters into a single whole.
4. The conceptual characters of S. Kierkegaard are characterized by flexibility, scalability, and vitality.

The foundation of this Network is the multiple subjectivity inherent in S. Kierkegaard: he created conceptual characters, including from individual traits of his character, biographical facts, giving them the features of a separate personality. Already in "Either - or" S. Kierkegaard speaks of the possibility of multiple subjectivity: in the preface he expresses the "assumption" that both types of worldview belong to one person: "One can imagine a person who went through both stages in his life or thought about both of them." [6]

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CRITICAL ANALYSIS OF THE VIEWS OF TURKOLOGISTS ON THE ETYMOLOGY OF SOME TURKIC SECONDARY ADVERBIAL PARTICIPLES

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This paper provides a critical analysis of turkologists` views on the etymology of secondary adverbial participle affixes ending in -madan², -dikcha⁴, -gyncha² (-indja²) in the Turkic languages. This makes it possible to present a complete picture of the evolution of the most productive secondary adverbial participle affixes and to study more deeply the issues of modern and historical morphology of the Turkic languages, filling in the existing gaps in the system of Turkic adverbial participle forms.

Key words: Critical analysis, secondary, adverbial participles, affixes ending in -madan², -dikcha⁴, -gyncha² (-indja²), turkologists, etymology, views.

It is well known that gerunds characterized by both similar and distinctive features occupy a special place in the grammatical structure of the Turkic languages.

Gerunds have been studied in various monographic studies of the Turkic languages. Despite the existence of a number of serious studies, the issues of etymological analysis of adverbial participle affixes and their semantic characteristics based on the material of the Turkic languages continue to be insufficiently studied. There is still no more or less common opinion among turkologists about the etymology of adverbial participle affixes.

The presence of opposite views about the etymology of adverbial participle affixes creates favorable conditions for a deeper study of this problem. For a more holistic view of the problem, it is necessary to consider the scientific views of both domestic and foreign turkologists.

The adverbial participle affix ending in *-madan/ -meden* is found in modern Azerbaijani, Turkish, Gagauz, and Crimean Tatar languages. This affix also functioned in the Old Turkic language and appeared in the phonetic version: *-matı/ -matın*. Regarding the etymology of the adverbial participle affix ending in *-madan/ -meden* there are different and contradictory views in the Turkic literature. Hypotheses about the origin of this affix were considered in the works of V. Thomsen, G. Ramstedt, V.V. Radlov, V. Bang, K. Brockelmann, P.M. Melioransky, A.M. Scherbak, A.N. Samoylovich, Zh. Deni, M. Ergin, Z. Korkmaz, S.E. Malov, V.G. Kondratiev, and others.

Regarding the etymology of adverbial participle ending in *-madan/-meden* I. N. Shervanidze notes: "This position is not without grounds, but at the same time it does not appear to be proven, since, as already noted, the final segment in the suffix *-pan* is *-an*, most likely, it is a relic of the ablative case, in the form of which the adverbial participle index of nominal origin freezes, while the nature of the element *-p* in the composition *-matın* is more closely related to the final consonant of the ablative case" [26, p.92].

On our opinion the view of I. N. Shervanidze is not sufficiently convincing.

Let's consider a few more hypotheses of some linguists regarding the origin of the very contradictory, in our opinion, adverbial participle affix ending in *-madan/ -meden*. The adverbial participle ending in *-matın/ -metin*, according to V. Radlov, A. N. Samoilovich and V. Bang, is formed by the negative affix *-ma* + the affix of a verbal noun *-t*+ indirect case affix *-in*.

This hypothesis has been criticized by P. Melioransky and V. Duda. They justified this by the fact that the affix of the verbal noun *-t* is not able to join the affix of the negation *-ma*.

Z. Korkmaz supposes that the adverbial participle affix is formed by attaching to the negative affix*ma*+ the adverbial participle affix to the vowel *-I/ -i* (which is recorded in Old Turkic language –A.M.). Z. Korkmaz considers consonants *-t, - d* of adverbial participle affix ending in *-madan/ - meden/ - matın/ - metin* as connective consonants [34, p. 269].

Note that M. Oner finds the assumption of Z. Korkmaz is controversial because, as he believes, the sound changes d>y, which mostly occurs in the root syllable, are not registered in the affixes of modern Turkic languages.

This negative adverbial participle affix, as M. Oner points out, was formed by means of syntax of complex sentences [35, p. 5].

For clarity, he gives the following examples: *tün udımatı küntüz olurmatı kızıl kanım töküti kara terim yügürti işig küçüg bertimök - Not sleeping at night, not having when I rested during the day, I gave my labor and strength (to the people), shedding their red blood and driving off seven sweats* [ibid, p. 5].

As you can see from the examples, the adverbial participle ending in *-matı/ - meti* is based on the structure of a complex sentence.

According to M. Oner, the affix ending in *-matı/ -meti* was formed using the negative affix *-ma+* the categorical past tense affix ending in *-tı*. This formalization of the affix ending in *-matı/ -meti* is directly related to the problem of forming sentences with pastcategorical verbs in the 3rd person singular as a noun: Turkish language - *şıpsevdi, imambayıldı*, Uzbek language - *bardı keldi gepler* - all words, etc. [35, p. 5].

It is interesting to note that the form of the past tense ending in *-tı/-dı* and negative adverbial participle form ending in *-matın/ -metin* is associated by S. E. Malov with the form of the participle-adverbial participle ending in *-tı*, which is observed in the monuments of runic writing [17, p. 72].

It is noteworthy that in modern Turkic languages this is not an isolated case when adverbial participle forms were formed with the help of temporary verbal affixes: Azerbaijan language - *Musa stansiyaya catar - catmaz ikinci zəng səsini eşitdi - As soon as Musa reached at the station, he heard the second call* [29, p. 227]; Turkish language - *Adile hanım çok onu görür görmez sevinmişti - when Adile Khanum saw him, she was very happy* [35, p. 6]; Karach. - Balk. - *Танг атаратамаз мала отларгъа кетдиле - Barely dawn, the cattle went out to pasture*, etc. [5, p. 68].

As the examples show, gerunds are formed by only from verbs in the third person.

In this regard, the statement of M. Oner is appropriate: "Only verbs in the 3rd person can be gerunds. The negative adverbial participle ending in *-matı/ -meti* was also formed by a verb in the 3rd person." [35, pp. 6-7].

According to A. M. Shcherbak, the affix *-madın* consists of suffix *-mad>maj* and the index of ablative case *-t* [27, p. 161]. A similar point of view is also shared by V. V. Radlov, K. Brockelmann, V. Thomsen, V. Bang, K. Menges, and others.

However, T. Tekin believes that this theory is unconvincing, since the affix *-t* does not form a noun with a negative base. He further emphasizes that the adverbial participle affix ending in *-matı(n)* in Orkhon-Yenisei inscriptions function without the affix *-n* [36, p. 204].

The second theory of T. Tekin, in our opinion, does not hold critics, since both the form *-matı/- meti* and the form *–matın/-metin* are observed in the Orkhon-Yenisei inscriptions.

Consider specific examples: *Sabin almatın yir sayubardiq - without listening to his words, you wandered through all sorts of land* [25, p. 481]; *tün udımatı küntüz olurmatı qızıl qanım tökti qara terim yügürti işig küçig betimök - Not sleeping at night, not having when I rested during the day, I gave my labor and strength (to the people), shedding their red blood and driving off seven sweats* etc. [26, p. 94].

The index *-n* in the adverbial participle affix ending in *-matın/ -metin*, according to M. Oner, is an index instrumental case. He believes that this is proved by the presence of index *-n* in the composition of other adverbial participle affixes in modern Turkic languages: Turkish lang. - *maksızın / - meksizin, - magın / - megin, - mazın / - mezin, - işın / - işin* [35, p. 7]; Gagauz lang. - *dıkçan / - dikgen* [20, c.245-246].

Another hypothesis regarding the origin of the adverbial participle ending in *-madan / - meden; -matyn / -metin* is the hypothesis that the subject is negative adverbial participle affix was formed by joining the negative affix *-ma* affix of the ablative case of the noun *-dan / -den* [26, p. 94; 13, p. 242; 32, p. 324; 33, p. 343].

This hypothesis, according to T. Tekin, as from phonetic, so from the semantic point of view is incorrect. T. Tekin motivates his assumption that the ancient form of this affix is observed not as *-madın*, but as *-matı/ -matın*. He also notes that the affix of the ablative case is not combined with verbal bases [36, p. 205].

So, L.A. Pokrovskaya, having studied the adverbial participle ending in *-madan/-meden* in modern Gagauz, concludes, that it is historically negative participle ending in *-maz/ -mez* in the ablative case. The thoughts of L.A. Pokrovskaya seem to us unfounded, since in the Old Turkic language this affix is observed in the form *-matı / -matın.*

This point of view is shared by V. Aliyev: "... in colloquial speech, as V. Aliyev notes, there is use of the adverbial participle of the type *görməzdən, bilməzdən* instead of görmədən, bilmədən, which allows us to join opinions of those researchers who etymologically derive the affix *-madan/ -meden from -mazdan/ məzdən*" [4, p. 38].

The theory of Y. Bensing is as follows: the adverbial participle affix to *-meti (medi)/ - metin* (- *medin*) was formed by joining the negative *-ma*+ affix *-d*, which forms a noun from a verbal root + adverbial affix *tı*< - *meti* <*me-d+ti* [1, p. 131].

The hypothesis of Y. Bensing, in our opinion, is unfounded. "This hypothesis, as T. Tekin rightly notes, is weak, since the Turkic languages do not have the affix *-d*, which forms a noun from verbs, and *yıd<yı-d, to-d<to and ki-d<ki* roots are presumed and not proven." Further he emphasizes: "In addition, the protosuffix *-madtı* was first formed as (*-mattı*) and not formed from the form (*-madın*)" [36, p. 204].

The view of G. Ramstedt seems to us unreliable, since there are few examples of this gerund and basically, this index (*-tı*) is interpreted as past tense index.

In this regard, we must specify the following opinion: "Already in the early Turkic era the form ending in *-dı/ -tı* has become much more verbal form, completely having secured the sphere of the past categorical tense" [25, p. 482].

According to T. Tekin, the affix *-matı* was formed from the Tokhar root *-ma -te / - mati+n* [37, p. 17-81].

We will allow ourselves not to share the opinion of T. Tekin, since the materials of the Tocharian language show that the negative affix -ma in this language follows before the verb. T. Tekin admits that there is a close connection between etymology of the negative adverbial participle affix ending in *-matın/ -matı* and negative affix *-ma/ -me* in Turkic languages.

As noted above, T. Tekin connects etymology of the studied affix with the negative Turkic affix *-ma/ -me*, namely, he believes that the adverbial participle affix ending in *-matın/ -matı* was formed by merging negative verb affix *-e* + verbal noun affix *-m* + adverbial participle affix *-tı(n): al-ı-me-ti(n)> almatın-almadan; udıme-ti>udımatı-uyumadan* [36, p.208].

In our opinion the theory of T. Tekin is not fully investigated.

It should be noted that in the "*Comparative-historical grammar of the Turkic languages*" the form *-madın* and *-madan* are not identified. It is motivated by this fact, that the participle-gerund form ending in *-tı* in the monuments of the runic letters is connected by S. E. Malov with the form of the past tense in - *tı/ -dı* and form of the negative adverbial participle ending in *–matın* [25, p. 482].

- *Matın/ - mayın*, according to N. N. Poppe, are dead forms of the instrumental case; where the first form is the noun on *-m (olum*, etc.), and the second is the verb - [18, p. 91].

Having investigated the existing theories regarding the etymology of the adverbial participle affix ending in *-madan/ -meden* in the Turkic languages, we conclude that the above views are unfounded.

In our opinion, M. Oner`s hypothesis is the most conclusive. According to this hypothesis negative adverbial participle affix ending in *-madan/ -meden* was formed by syntax of a complex sentence and directly related to the problem of forming sentences with pastcategorical tense verbs in the 3rd person singular as a noun.

Adverbial participle ending in *-dikcha* in Turkic languages was formed by merging two affixes: *–dik и –cha*.

Let us consider the main hypotheses regarding the etymology of the affixes *-dik* and *-ça*.

The affix ending in *-dik*[4] is inherent in the Oghuz group Turkic languages. This form can be substantivized, and be used with case and possessive affixes.

The etymology of the affix ending in *-dik*[4] is interpreted ambiguously in the Turkic literature.

V. I. Kotvich (1962), G. I. Ramstedt (1957), A. N. Kononov (1956) and others believe that this affix was formed by combining the elements *-dy* and *-k*.

O. Böhtlingk (1851), K. Brockelmann (1951), A. P. Potseluyevsky (1943), and others tend to believe that the affix ending in *-dik*[4] is primary, and the form ending in *-di* was formed in the result of dropping the last sound *-k*.

The most significant view in this regard is that "… that the decisive role in this evolution was played by formation in place of the participle form ending in *-dyq* of a conjugated verb with the abbreviated suffix *-dy*. This new form was retained throughout the entire Turkic language region; at the same time, the participle ending in *-dyq*, as if performing its role, i.e. forming a conjugated verb, went to side. In the vast majority of languages, this suffix has given way to its competitor" [15, p. 293].

Therefore, A. Kotvich also shares the hypothesis, according to which the affix ending in *-dik*[4] was primary, and the affix ending in *-di* is derived from it.

The affix *-dik*[4], according to B. A. Serebrennikov, was formed by merging the affixes of verbal adjectives *-t* and *-(y)-q* [24, p. 230].

According to I. N. Shervanidze, is still difficult to give an unambiguous explanation of the origin of the form ending in *-dik*[4]. His hypothesis boils down to the fact that this affix is a combination of the oldest elements *-t,-d + ~(ü)k, ~(u) q* [26, p. 100].

Some turkologists tend to believe that the past tense affix is *-di*[4] formed as a result of the contraction of the form ending in *-dik*[4].

This hypothesis is shared by N. A. Baskakov (1952), A. P. Potseluyevski (1943), etc. So, these scientists agree that in the process of historical development the form ending in *-dik*[4] was subjected to contraction (i.e., the

final consonant *-k (ғ)*) fell out). As a result the past tense form ending in *–di* is formed [16, p. 40-71].

O. I. Böhtlingk interprets the contraction of this form as follows: originally existing (and continuing to exist) verbal-nominal forms 1st person - *алдыкым 'my taking', алдыкын 'your taking', алдыкы 'his taking'* etc. in the process of conversion into the past tense lost consonant *-k*, and the resulting long vowel has undergone contraction: *алдыкым>алдығым > алдым >алдым 'I took'* [2, p. 305-306].

As we believe, this hypothesis of O. I. Böhtlingk does not stand up to criticism. If the attraction really had place in the historical development of the Turkic languages, then traces of this phenomenon would be recorded in written monuments, as well as in dialects and subdialects of the Turkic languages. However, as P. M. Melioransky rightly noted, there are no traces of the contraction process *алдыкым > алдым> алдым* in any Turkic dialect [18, p. 18].

The Turkological literature also reveals the hypothesis that the temporary form ending in –dı came from the noun of action ending in *-t*, which, in turn, accompanied by the words bar - *is* ' or yok - no, not available. Proponents of this theory are N. K. Dmitriev (1948), V. Brockelmann (1951), P. M. Melioransky (1900), B. A. Serebrennikov (1979), and others.

This archaic verbal noun ending in - *yt/ - it/ - ut/ - t*, as N. K. Dmitriev notes, took possessive affixes: *алытым бар – I took, алытым йок – I did not take*. In the future, the words бар- is and йок – *is* not fell away. In the result of this the form of *aldym – I took* was arised [9, p. 141].

B. A. Serebrennikov, also adhering to this opinion, emphasizes that the verbal noun ending in *-yt, -it* as part of the past tense forms ending in *-dy, -di* reflects features of archaic thinking when the past tense was associated primarily with the result of action, and not with the fact of its presence in the plan of the past. Therefore the verbal noun was a convenient tool of its expression [23, p. 31].

The nominal nature of the past tense forms ending in *-dy* was noted by A. M. Shcherbak [28, p. 48].

In the light of the above, it follows that the form ending in *-yt* does not only function as a verbal noun, but it also conveyed the meaning of the indicative mood. It is possible that this form as a result of this fact can accept personal affixes. The affix *-t* is known to be an ancient index of plurality. Thus, ambiguity of the form ending in *-yt* is associated with the affix *-t*.

For Turkology, the opinion that plural affixes originally conveyed the meanings of both plurality and uncertainty is of interest. Otherwise, multiplicity always carries in itself, shades of numerical uncertainty. From this

we can conclude that the ancient plural affixes that are simultaneously a formant of uncertainty, combined with verbs, form forms whose values are closely related to uncertainty. When the value of ambiguity of this form was lost in the result of phonetic changes - *it*> *tim* > *dim* the form of the past definite tense was formed.

It is known that the narrow vowels *-i, -e(-u), -o,-ə* in the Turkic languages since ancient times express certainty [12, p. 345].

However, narrow vowels are used in the formation of the accusative case affix, possessive affix, in the meaning of which there is a shade of certainty.

Etymology of the second component *-ça* of the adverbial participle affix ending in *-dıkcha* is ambiguously interpreted in Turkology.

The affix *-cha* is found in early monuments of Turkic languages. In these monuments, the comparative case was formed using the *affix -cha: каның субча југурті - your blood ran (there) like water* [17, p. 39].

Note that the comparative shade of the affix -cha is also observed in modern Turkic languages.

In these languages adverbs are mainly formed by means of the affix *-cha*: Azerbaijani language - *Sizin fıkrinizcə bir müəllim, əwəlcə tələbənin maraq və zövqünü öyrənməli, sonra da ona müvafiq dərs verməlidir? - In your opinion, should the teacher first study the interests and student preferences, and only then teach appropriate items for him?* [30, p. 616].

It is significant that in Uyghur texts, the case affix *-cha*, along with the comparative meaning, also conveyed the meaning of similarity: *Tenride tirigdekiçe - like in life*, etc. [3, p. 256].

There are different points of view regarding the origin of the phonetic variant *-gyncha, - ginche, - gunca, - gunche* of the adverbial participle affix ending in *-ynja, -anja* in Turkology.

In the opinion of most researchers affix *-gyncha* is complex affix and consists of a affix of verbal noun *-gyn, -gin, -gun, -gyun* or participle ending in *-n*, and from affix *-cha, -che*.

"Some affixes, as A. E. Meshadieva notes, have acquired an independent meaning of words (for example: *lig (lıq) - full* - in Uzbek and Uyghur languages), and the rest, on the contrary, came from independent words (for example: - *dash (daş)*, - *cha (ça)*, - *dek/ - day*)" [19, p. 249-292].

The wordforming affix of the adverb ending in *-cha* is formed, as A. N. Kononov believes, "from the word *-ça / -çağ - measure*, *time*" [14, p. 108].

As you can see, some scientists refer the affix *-cha* to the category of affixes that originate from independent words. The affix *-cha, - che* is named either as a particle [7, p. 65], or as an adverb affix [10, p. 40-407; 14, p. 108].

Many researchers identify the participle affix - *gyn, - gin, - gun, - gyun* with the affix *-gan, -gen*, from which, therefore, affix - *gancha, -genche* is formed.

Regarding the etymological community of participial affixes *-gancha, -genche and -gincha, -ginche, -guncha, -gunche* N. K. Dmitriev writes: "In essence, these forms are identical. The first goes back to the form ending in *-gan/ - gen, - kan/-ken*..., and the second goes back to the form ending in *-gyn/ - gin, - kyn/ - kin* and *-gun/ - gyun, - kun/ - kyun*. Forms ending in *-gan*, etc. and ending in *-gyn* etc. are related in meaning and origin: the latter only indicates a more static concept and it fits closer to the Russian adjective " *fluent, recumbent, standing*", and the first contains more dynamic and can be attributed to the section of participles like the Russian "*running, lying, standing*". In most languages of the Turkic system, the second form is reduced to categories of rudimentary formations. There is the same fact in Kumyk language" [8, p. 145].

According to A. N. Samoilovich, M. Askarova, and the authors of "*Grammars of the Altaic language*", variants of the affix with narrow vowels in the first syllable are formed from the Turkic future participle, which ends in *-gu* and particles *-cha* and inserted *-n* [22, p. 65; 6, p. 23; 7, p.65].

The statements of the authors of "*Grammar of Tuvan language*" are indicative: "In dialects of some language, the wide vowel of affix *-gan* has become *-y (-gin)*, and in Uyghur and Tuvan this affix as a result of its further phonetic development has lost the final *-n* and turned into *-gy/ -gi*... Some researchers see in this verbal form the ancient verbal noun ending in *-gy* (for example, bargy), joined with the adverbial affix *-che/ -cha (-chak)*, but the predominant use of the first element of the spliced affix in modern Turkic languages in the form of - *gan/ (-gancha//-...)* leads us to believe that this verbal form has the participle ending in *-gan* fused with the affix *-cha*... the affix of which in modern Uyghur and Tuvan languages has passed to *-gy, - gi-* (Uygh. *giche* and Tuv. *gizhe*) " [11, p. 406-407].

It should be pointed out that this adverbial participle is also considered as the case form of the participle ending in *-gan, -gen and -gyn, -gin, -gun, -gyun.*

A similar point of view is shared by G. I. Ramstedt: "The various case forms of this participle (i.e., ending in *-ganche*) act as the function of verbal definitions: Turkic - *alyanca, alyanda*n, etc." [21, p. 135].

G. I. Ramstedt also writes: "Currently new participial formations of this type (i.e.*-gyn* A.M.) do not occur any more in the Turkic languages, but they are still used as adverbs combined with affix *–cha* even now, for example: *uyg. män kalgincä - until I come; küci jitgincä - until I have enough*

strength; tour. görünce - as soon as he saw, gelince - when, until, how only he will come, almayınca - without taking, akşam olmayınca - before evening, before evening. As an equivalent form, this affix in most Turkic languages has a common type of adverbial participle: Turk. - *dıkça*, Kaitak, Karagas. - *gancha* and in East.-Turkic language - *gucha*" [21, p. 137-138].

Some conclusions of G. I. Ramstedt, in our opinion, do not stand criticism. First, the affix *-cha/ -che* in most modern Turkic languages is an index of an adverb, and it is also found in some cases as part of postpositions.

As a case affix, as writes A. E. Meshadieva, " Index *-cha*, - *che* among the Turkic languages is found only in Tuvan and Shor languages: Tuvan language *kemche - to the river*, etc.". Turkologist also notes: "Traces of this directional meaning in relict form we can observe in other Turkic languages. For example, this form is observed as part of postpositions: Tatar language - *buyunça*; Azerbaijani language - *boyunca - during, along*" [31, p. 78].

It should be emphasized that the index *-cha, -che* in the composition of cases denotes direction, i.e. the case formed by this affix is directional. We believe that there is no analogy between the directional case affix *-cha / -che* and index *-cha/ -che* in the adverbial participle ending in *-indja/ -gancha*, which goes back to the word *chak*, which means - *time, moment*.

In our opinion adverbial participle ending in *-indja, - gyncha* was formed by the affix *-cha/ -che*, which goes back to the word *chak- (time)*, since this adverbial participle part in modern Turkic languages mainly conveys a temporal connotation.

Second, it seems to us that the phrases like "Uighur language. *mân kälgincä - until I come*; Turkish language. *görünce - as soon as he saw; almayınca - not taking*", etc., given by G. I. Ramstedt can hardly be classified as adverbs.

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A COWBOY, ONE OF AMERICA'S GREATEST FASCINATIONS

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The purpose of the this article is to reveal the phenomenon of the American cowboy. Dashing guys shooting colts right and left – this screen image of a cowboy instilled in us from childhood. But the real picture looks different. The article reveals the reasons for the appearance of cowboys, describes the cowboy everyday life, their main activities, the article introduces the most famous cowboy in America, Buffalo Bill, as well as a sports competition called Rodeo. The scientific novelty of the work consists in the study of documentaries and cowboy folklore. As a result, the phenomenon of the American cowboy is defined.

Keywords: phenomenon, cowboy, Wild West, cattle, ranch, rodeo, western

Cowboy is a person who helps take care of a large herd of cattle for a ranch owner. In the US, cowboys won fame in the days of the Western frontier. Their reputation for bravely facing danger and hardship made them heroes to many Americans. Exciting tales of cowboy life, sad cowboy songs, and colorful cowboy language have all become part of American folklore. Many of the most popular novels, motion pictures, and television shows have been about cowboys. The **purpose** of this work is to reveal the phenomenon of the American cowboy. The main **research methods** are not only the study of literature and other sources of information and text analysis, but also study of documentaries and cowboy folklore.

The appearance of cowboys in their "classic" form is directly related to the development of the Wild West. At the beginning of the XIX century people in search of a better life began to move to the Great plains. Settlers-pioneers built new settlements and started economic activities. Soon there were several main routes connecting the West and East of the continent. The era of the Wild West was beginning. At that time in North America there was a fairly developed animal husbandry, but in the middle of the XIX century a new stage of its development began. The great plains

could be used as giant grazing grounds for livestock. The climate and flora of the prairies allowed cattle to be kept in open pastures all year round. The specifics of cow grazing in this area led to the emergence of the profession of horse herdsman.

Frontiersmen who had moved to the West became the first cowboys. Probably nearly a fourth of all cowboys were blacks, and another fourth were Mexicans. Many of the black cowboys moved to the Western frontier after the Civil War. Others had been slaves on Texas ranches before the war. Not all the cowboys are men or boys; some are women. Throughout the West there are cowgirls who work on the range and take part in cattle drives. Many are the wives and daughters of ranch owners.

American cowboys copied much of the equipment used by Mexican cowboys, who are called vaqueros. The big sombrero worn by vaqueros became an American cowboy hat. La reta, the rope in Spanish, became the lariat used by cowboys to rope cattle. One end of the lariat was knotted to form a small eye, called a honda. The other end of the rope slipped through the honda to form a large, adjustable loop. A cowboy kept a coiled lariat hanging from his saddle. The saddle used by cowboys was adapted from that of the vaqueros. It had a large horn in front, to which the cowboy attached his lariat when roping cattle. The gun, in most cases, was a revolver with six chambers known as six-shooter.

Fully outfitted for work on the range, a cowboy was covered from head to foot in a protective costume that identified him as distinctly as a knight's armor identified its owner. He normally wore long jeans unless it was too hot. His shirt was typically collarless and made of cotton or flannel. His woolen pants were sometimes fortified with buckskin sewn over the seat and down the inner thighs to keep them from fraying where they rubbed against the saddle. He rarely used suspenders, since they chafed him and just as rarely wore a belt unless, as in later days, he was a rodeo rider hankering to show off a fancy belt buckle won in the arena. As a practical measure his pants had to stay up by themselves and thus were bought to fir tight around the waist. Because it was inconvenient to carry anything in pants pockets while riding, the cowboy usually had on a vest with deep pockets where he kept his Bull Durham tobacco, and perhaps a tally book for keeping count of the cattle.

Special attention should be paid to the code of cowboys. Here are some rules from it.

1. When passing someone on the road, say Hello.

2. Approaching someone from behind, loudly say Hello to him before you will be in the range of a pistol shot.

3. Don't wave to a person on a horse. This can scare the horse, and the person will think that you are an idiot (the correct greeting is a nod).

4. If you pass someone on the road, don't look back. This indicates a lack of trust in the person.

5. Riding another person's horse without their permission is like making love to their wife. Don't even touch someone else's horse.

6. Never shoot an unarmed man. Never shoot a woman at all.

7. The Cowboy is pleasant to talk to, even if he is not in the spirit. Only weak people complain, and cowboys hate weak people.

8. Always be brave. Cowards are not tolerated in any form.

9. A cowboy always helps someone in need, even if it's a stranger or an enemy.

A cowboy's life was filled with hard work, danger and loneliness. Tending cattle was hard because the animals got into trouble so often. Each day, a cowboy faced the risk of broken bones, crippling accidents, and even death. Very few ranches were near a town with a doctor, and so cowboys doctored themselves most of the time. A kick from a horse could kill a cowboy. And a mean horse might kill a rider by racing under a low branch. A cowboy could be trampled to death in a stampede. In general, cowboys led a lonely life. Two events broke the monotony of a cowboy's life on the ranch – the roundup and the trial drive. The roundup took place each spring and fall. A roundup was necessary to identify and brand newborn calves. A calf received the brand of its mother. Each ranch had its own brand, which it placed in a certain position on all its cattle. The trail drive was a major event in a cowboy's life. A trail drive usually lasted about two or three months and covered as much as 1.000 miles (1.600 km). During the long drive, cowboys moved from two thousand to three thousand cattle to a railroad station for shipment to Eastern markets. They worked long days and sometimes through part of the night. At the end of the trail drive, the cowboys arrived in a cow town, where the cattle were sold and loaded on a train.

Life on the American frontier was hard and many of the frontier towns where the cowboys let off steam were rough, often wild places. These towns were home to shopkeepers and ordinary people trying to build new lives for themselves in a still untamed land. But they were also filled with gamblers, swindlers and outlaws. Most cowboys didn't come face-to-face with the outlaws. Once the cowboys had spent their time in town after the trail drive, they made their way back to the ranch, where the cycle of raising the cattle, rounding them up and driving them to market was repeated. But the West was filled with cattle thieves who tried to rob ranch owners of their animals, so cowboys occasionally had bloody encounters with

cattle thieves. Some cowboy brigades did not disdain stealing cattle from colleagues to replenish their entrusted herds or to sell them to third parties. The so-called wars in Lincoln and Johnson counties are well known. Disputes over the division of territories and the sale of livestock led to long-term conflicts and the death of several dozen people.

It is believed that the classic era of cowboys lasted only two decades. Already in the eighties, the situation in the livestock market has changed significantly, and along with it, the work of shepherds has changed. The reason for this was new inventions and infrastructure development.

The first blow to the cowboys was the invention of barbed wire and the division of pastures. Now the cows grazed only in the fenced area and did not stray. Accordingly, the need for shepherds to gather them into a herd has been reduced.

The second factor was the development of infrastructure. The railroads had reached Texas, and their stations were now not too far from the pastures. The state also opened its own processing plants that could purchase local livestock.

Grazing has become easier, and railroads have reduced the length of runs. Along with this, the need for horse herders has also decreased. With the nineteenth century, the age of the cowboys was coming to an end. However, this profession has not completely disappeared. Small numbers of its representatives continued to work until the forties of the XX century. Then there was a new restructuring of the industry, and the appearance of the breeder finally changed. Cowboys on horseback still exist in the United States, but are now a real curiosity.

Buffalo Bill, whose real name is William Cody, is the nation's most famous cowboy. His show includes hundreds of cowboys, cowgirls and Indians. It features plays in which cowboys leap from their horses to halt runaway stage coaches, foil bank robbers and battle Indians to the death. At the beginning of the XX century, the newly created cinema was added to literature and diverse shows. The first films-westerns appear, of course, of the adventure genre.

The sport of rodeo was created more than a century ago when a handful of cowboys decided to see just who was the best bronc rider or steer roper. Today's the Professional Rodeo Cowboys Association athlete still ropes and rides like his 19th century counterpart, but now many cowboys travel to more than 100 rodeos each year and are able to make a living competing on the circuit. In fact, PRCA cowboys compete for shares of nearly 30 million dollars and the sport continues to grow in prize money and popularity.

The real cowboys who existed in the second half of the century before last were simple hard-working shepherds. For a small fee and a roof over their heads, they watched the herds, drove them, and protected them. The work of a cowboy was not the easiest and involved a lot of routine. Sometimes the performance of work duties was associated with a danger to health and life. Nevertheless, the cowboys were doing their job, which was important to everyone around them.

From the outside, for an ignorant person, the work of a cowboy could look interesting, heroic and romantic, and the negative aspects went by the wayside. This perception quickly led to the formation of a new literary genre, which then gave life to several new directions.

For a number of special reasons, the artistic reflection of the life and work of "cow boy" was markedly different from reality. These differences then turned into stereotypes that became mandatory elements of the work. As a result, the image of the cowboy in art has lived its own life, not quite similar to the real work of horse herders.

However, this is hardly a problem. At one time, cowboys became more than an interesting phenomenon and an important component of the Wild West, as well as the national economy of the developing United States. Later, on the basis of a real image, a classic artistic image appeared, significantly different from it. Despite notable differences and a distinctive history of appearance, both images have become an important part of North American culture and have not gone unnoticed abroad.

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MORPHOLOGY OF A KNIGHTLY ARMOR AND THE CHURCHES «EGLISES FORTIFIEES» IN THE XVI - XVII CENTURIES

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In article the problem "contents and forms" which was always one of the main problems of any design activity is considered. The analysis of morphology of protective arms of knights (from Gothic to Renaissance) and means of fortification of rural churches "eglises fortifiees" which occurred under the influence of improvement of firearms during the 16-17th centuries. As an example development of a system of fortification of the rural strengthened churches of the region Tyerash (from a gothic style to new type) located in the territory of two modern departments of France undertakes: Aisne and Ardennes.

Keywords: the knight, firearms, a maksimilianovsky armor, the strengthened churches, Ena, Ardennes, the Italian wars, fortification, cult constructions

Introduction

The problem "contents and forms", was always one of main if not the main problem of any design activity. How ideological and art concept of an era in general and the certain author, in particular, is capable to be embodied in a specific form or an object, so the last can show extent of art and technical development of society. This problems gets up the more sharply, than the society on so-called "turning points" of historical development as during such periods not only the technological, or religious and philosophical component, but also an art and esthetic paradigm of

society very often changes is exposed to more serious transformations. Most brightly, similar processes can be fixed in the field of development of morphology of arms and fortification as the last are often the most demanded during certain eras of development.

Research objective

Arms, developing under own laws, to turn out to be inevitable consequence of immemorial opposition of two forms of war (attack and protection). Emergence of offensive weapon of a new type practically always leads to countermeasures of an invention of an adequate security measure. However, the level and quality of arms of this or that society directly depends on efficiency and the level of its economic development. Need of constant improvement of an organizational and technological component of protective and fortification arms defines the level of development of any society and its readiness to defend the safety and to dictate to people around the political and economic interests.

Results of a research and their discussion

The Gothic style in fortification architecture and in a military esthetics and shaping of protective equipment of the individual fighter (it was made of small corrugated plates) remained up to the beginning of the XVI century, and was especially extended to territories of Germany and Northern France at the end of the 15th century. At the same time, in the last decades of the XV th century (it is obvious under the influence of the developing small arms) other morphology of which shaping the rotundity and width «a maksimilianovsky armor» contrasting with the angular, zaostrenno-extended forms of a Gothic armor is characteristic is formed. [2., 197] On all visibilities, such form of an armor arose thanks to morphological synthesis of the Italian and German protective elements. Such interpenetration became possible, probably, thanks to long military campaigns so-called. The «Italian wars» (1494-1559) between the French kingdom and the Spanish-German empire. In it the period, owing to rapid development of firearms arises a question of expediency of a full armor though the 16th century differs in the greatest luxury in their finishing (a rich engraving, stamping, blackening, finishing by gold and so forth). The matter is that already in the first quarter of the 16th century before the European armorers sharply there was a problem of creation of an armor capable to resist to firearms which were constantly improved. Master armorers try to make a full armor capable to weaken or at all to extinguish the penetrative force of a shot from an arkebuza, a musket or a gun. This armor passed special tests during which they had to sustain direct hit. If the latny armor did not make the way a bullet, it was called «kind» (*bonne et suffisante-fr.*). In case an

armor did not pass similar tests and the bullet punched armor, they were called «easy» *(a le legere-fr.)*. [2., 200] Knights (*gendarmes-fr*.) and a heavy cavalry *(cuirassiers)* originally still used the closed helmets like «*armet*» with a round dome and the pointed Gothic visor "a bird's beak" which allowed the soldier's head to rotate freely to the right and to the left, but did not allow the head to bend forward and back. But already to the middle of the 16th century this type of a helmet is used only for knightly tournaments in which the similar shortcoming was not a serious problem. By 1510 the simple ledge on a helmet dome going from a forehead to a nape turns into a steel stamping crest, on a front part of a helmet the fastened, and the viewing crack was usually cut out in the visor. In the second quarter of the XVI century the visor consists already of two parts: the top supplied viewing crack and lower – the «buviger» (having air vents). Both parts of a visor in a helmet were pinned among themselves spring, recorded over ears. Thus, the closed helmet of Gothic type quickly is improved under the influence of new conditions of conducting fight, being gradually transformed to a helmet like «burginiot» which for the first time meets in 1505. Burginiot represented an advanced so-called «pseudo-antique» helmet and at addition of «buviger» to it did not concede to the closed helmet on the protective properties any more, being simpler and more convenient for carrying by riders (cuirassiers). In view of the functional properties soon «burginiot» won popularity among the nobility and even it began to be applied among infantry officers, halberdiers and pikiner. [1., 202] Approximately by 1540 as protective arms of soldiers a «morion» helmet appears. Under the influence of new fire tactics also other parts of protective arms and first of all a basic element of protection of the case – a cuirass change. Emergence in the XVI century of more powerful and long-range firearms of an arkebuza and musket caused originally sharp strengthening of an armor, by increase in thickness of metal. However, subsequently soldiers and armorers understood that the general increase in weight of a full armor is unreasonable therefore began to strengthen the most vital parts: helmet mask, bib, shoulder straps and epigonations. Usually under an armor so-called «poddospeshnik» put on, in the 15th century to replace «gobisson» and Acton quilted doublets leather jackets to which under mice «kolchuzhny» inserts or metal plates fastened that facilitated the gross weight of full protective arms a little come. [2., 203] Elbow pieces at riders of a heavy cavalry (gendarmes and the cuirassier) during this period surround «naruch» by the form - like a bracelet that almost does not hold down the free movement of a hand during fight. During transition from a «Gothic» armor to «maksimilianovsky» forms to

become very important innovation the latny collar which assumes the main weight of an armor, shoulder straps and «naruchy». Somewhere in 1540 – x years the cuirass is extended, and the line of her waist in front falls down and forward. Emergence of new type of firearms – аркебуз and muskets added to already existing divisions of pikiner also separate parts of arkebuzir and musketeers. Pikinera and halberdiers as protective arms carried brigantines, chain armors or an easy armor with kolchuzhny sleeves and helmets like «burginiot», «salad» or «morion». Officers of infantry were dressed in an easy armor, had a small board and are armed with a sword, a dagger, a gun and protazany. [1., 206] During the period from 1545 to 1600 a full armor (*cap-a-pie, фр.*) undergoes significant changes. The cuirass is gradually extended, and on a bib waist the sharp ledge in front appears. At the end of the 1570th years it turns into similarity of the «peskoud» characteristic of the last quarter of century. The epigonations consisting now of a set of narrow plates approximately from 1560th extend so that under them it was possible to put on the wide short trousers which became fashionable. Shoulder straps of an armor during the late «tyudorovsky» period of 1545 - 1600, have sufficient thickness as before, and the right shoulder strap is truncated as before in order that the rider could hold a heavy spear. In shoulder straps of a light cavalry – shoulder straps are symmetric. Sometimes the lamellar shoulder straps closing from above both a shoulder, and outer side of a forearm meet. At the same time armpits of the soldier are protected by special metal disks. So-called «nalyadvennik» gradually get out of fashion and give way to «kolchuzhny skirt», and a latny collar, shoulder straps, the lower part of a cuirass and epigonations are quite often decorated at the edges with leather or velvet gear strips. Heavy cavalry (gendarmes and cuirassiers) during the specified period helmets with «buviger» continue to use closing though a considerable part of commanders prefer helmets like «burginiot» not having a puff. «nagolennik» at anklebones begin to make (fig. 1) In the last quarter of the XVII century also lamellar to have big freedom of action, and sometimes «nagolennik» terminate at an anklebone of the rider, and feet protect the «kolchuzhny» boots which are coming to the end with steel socks. Wide «maksimilianovsky» socks of «sabaton» approximately since 1550 - 1555 practically get out of fashion, and their place is taken by socks of an oval form which also replace subsequently square socks. Also, in the second half of the same century the trend of refusal of some elements of a full heavy armor develops about what it is possible to find numerous mentions at the French and English contemporaries. [2., 209

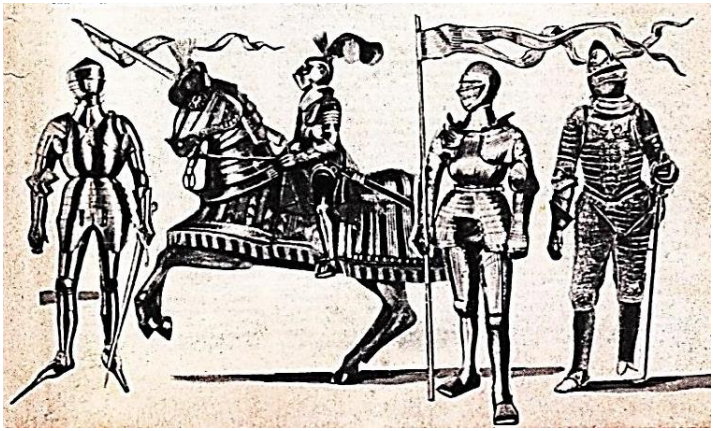

Fig. 1 From left to right: a Gothic armor of the Milan master Tomaso Negroni da Ella Masalya of the French type (a helmet «baskint»), a set of the Italian Gothic armor for a horse and the rider (a helmet «armet») - XV, «Maksimilianovsky» armor of work of the master Helmshmidt from Augsburg (a helmet «armet») 1520, the Italian armor «a breast» a burginyot helmet - the 2nd a floor the XVI-th centuries.

It is interesting to note the fact that processes of shaping of protective arms of the soldier, in addition, happened against the background of paradigm shift of the all-European ideological and art processes. The religious and philosophical ideas of the High (Gothic) Middle Ages were replaced by the ideas of the Renaissance, with its obviously humanistic values and thirst for all «antique» which had the impact on all spheres of cultural and art and military processes. Probably for this reason, we can observe similar «metamorforza» also in development of fortification of this period of time. In a designing process and constructions of strengthenings of the cities or locks gradually there is a refusal of «Gothic» forms in the form of solid high walls from the stone blocks and high peaked towers supplied with wooden or stone hinged fighting galleries (mashikula). Instead the accent is transferred to protection of separate, most weak spots by construction of lower and thicker double walls from a brick, with the internal earth. Instead of high towers-«donzhon», architects try to construct stocky towers forts (with double brick walls with a zabutovka), for placement of artillery in them and therefore supplied with numerous loopholes embrasures. Practically difficult angular connections of high and direct walls and towers disappear in view of the fact that such connection is less

strong to influence of artillery as has internal tension. Now architects try to round off as much as possible fortification forms, giving to walls and towers forts a certain inclination for a possibility of a ricochet. Former Romance and Gothic churches offered passive protection behind the thick walls, narrow windows, high and small gate which easily could be barricaded from within. High Gothic bell towers served also as the place of the review of vicinities and «donzhon», as a last resort. The observer who was vigilantly on duty on a tower warned a bell ring about approach of troops of the opponent. At approach of groups of the opponent or gangs of robbers (that quite often represented one, and too) the rural church of France offered neighboring inhabitants a shelter. For centuries it performed this function before foreign mercenaries, landsknechts, soldiers of Papal guard, Lyezhets, Dutches. The church often was the only strengthened village construction, besides it was rather spacious to accept all population. Remained strengthened Romance (XI-XII вв) and Gothic (XIII-XV вв) the churches very numerous around Laonnois and Soissonnais, – are rare in the region Thierache in the territory of two modern departments Aisne and Ardennes. As they were strongly reconstructed in the 16th century during an era of continuous wars from 1515 to 1715, on border of Picardy and Champagne. There was an urgent need specially to strengthen cult Christian constructions (keepers of relics and values) which thus became strong fortification points in the general system of defense of northern borders of France. [3, 174] Thierache of that era it is possible to distinguish three main types From «eglises fortifiees» fortification decisions: 1) Full preservation of the building of ancient church (Romance or Gothic) and construction around it some fortification elements (the acting hinged loophole-mashikuli, wooden fighting gallery, angular watchtowers (bay «bartizanes»), loopholes and the «safe-hall» above: Renneval, Morgny-en-Thierache; 2) Partial preservation of ancient church (Romance or Gothic) and construction on its base of the new building of the strengthened building (type fort): Prisces, Burelles; 3) Construction of absolutely new strengthened church conceived entirely as the mixed building, fortification and religious appointment, real «eglise fortifiee» Plomion, Englancourt. [4., 136] Each of these decisions corresponded to a separate concrete situation, but it is possible to allocate some general trends. Protection of flanks by maintaining the flanking fire at attackers, became possible, first of all, thanks to construction of angular watchtowers (bartizan) at top of buttresses of all church building. Access to such angular watchtowers and hinged loopholes (embrasures) was generally carried out through a roof of church over the arches and overlappings of a ceiling. Sometimes roofs

of the building raised in such a way that it turned out the real closed «safe hall». The largest windows of an upper case towering over the acting hinged loopholes formed peculiar fighting galleries passes behind choirs of the building, for example, in an apse of Montcornet church. [4., 134]

Fig. 2 Eglises fortifiees: l`Aisne, Burelles, Plomion

Profound studying of a fort church of Byurel showed a complex and logical defensive system in which forts towers, «bartizan», embrasures correspond to the rules peculiar to military defensive works. Tens of embrasures loopholes of the building located at all levels are both observation posts, and the weapon emplacements providing observation of the horizon and the next churches, the roads conducting to the village and their intersections, church vicinities. Other strengthenings, the acting hinged loophole and just loopholes, cover with frontal nastilny and hinged, cross fire of a collar and window of church. Such system of strengthenings not only as similar fortification systems meet also in most the strengthened Tyerash's churches. Each of these decisions corresponds to a special situation. Numerous factors could affect the choice moment: it is possible to present influence of the following circumstances: solidity of the ancient building; motivation of residents of the village; financial means at their order; support of the señor, king, clergy; difficulties are military, public and psychological, prospect of new disorders and new robberies; will of the population and bodies of community; intensification of enemy attacks; the economic depression, diplomatic tension between France and Spain which was expressed in repetition of «chivalrous war» *(guerre guerroyable)* – all this is quite enough to explain the nature and scale of a fortification boom of that era. Some ancient churches which design did not provide earlier defense of inhabitants at all from now on were modified very thoroughly. The speech did not go just about only to punch loopholes within the walls of a nave, a cross aisle or choruses. Though, it is possible to notice traces of this work on strengthening of actually religious parts of

stone churches of Montcornet, Vigneux today, Renneval. Firing and the review became possible thanks to construction of angular sentry towers-«bartizan» at top of buttresses of Rozoy-sur-Serre and Montcornet. Access to angular watchtowers and the acting hinged loopholes was often carried out through a roof of church over the arches and overlappings of a ceiling. Sometimes these roofs raised so it turned out the real «safe hall». The local historian R. Rodyer well described reorganization of ancient choruses of the 13th century of churches in Morgny-en-Thierache, Renneval and Vigneux. The works which are carried out in the first half of the XVI-th century consisted in overlapping of the temple the arch and in increase and a thickening of walls to establish the new room above. In these three cases of a wall of high halls were punched by loopholes with double slopes (inside and outside). It is, thus, about rooms for the shelter and about the rooms adapted for active defense. And, these loopholes are numerous and located at height of human growth, within the walls of a nave, a cross aisle above in towers and turrets. Forms of loopholes constantly changed during the XV-XVIII centuries, today is conducted their typological, chronological and regional researches. The most widespread type (the end of XVI – the beginning of XVII) outside (from attacking) represents a narrow gleam (several cm), more or less high (10-40 cm), serving as at the same time aim opening and an opening for arrangement of the fire tool (fig. 2). This crack, a visible gleam on an outer surface of a wall, is sometimes framed with two or four ceramic stones whereas the wall was from a brick. From within (from protecting) the loophole represented more or less wide embrasure sometimes inclined from top to bottom to facilitate hinged firing, with direct or vaulted horizontal facing. The role of active defense of these apertures is often called into question. Numerous observations and modern to them locks quickly convinced us of all strengthened churches that, perhaps, they were used for firing from easy firearms. Studying of apertures of firing of that time allowed to estimate also a role of embrasures. In Origny-en-Thierache also wider and high apertures alternating with them on the same wall are noticed in the same room of an embrasure actually for firing. Openings on angular watchtowers in churches Fontaine and Englancourt often have the same functional specialization. The tower containing several floors with the angular turrets located on each side. The quantity and arrangement of turrets varies. If at a «donzhon» one such turret, it is located from gate (Byurel) and hides a ladder. If at a tower two turrets on corners from a «donzhon» that they are symmetrized from gate, for example in Gronard. Or one of turrets is located from gate, and the second, located in an opposite corner provides

the flank of a «donzhon» and nave in Prisces and in La Herie. Gate were especially strong, are strengthened, perhaps, nails and are upholstered with iron as attacking always tried to take by force this weak point of the building. That resist blows of a ram of a collar could be complemented with the thick bar which is usually lying in deep dredging under fifth (support) of gate. Gate opened inside and as soon as people came, they took out a bar from the groove arranged in a laying of an opposite rack, locking, thus, a door cloth. Today we can see grooves of this bar behind fort church gate in Prisces. Some churches were completely constructed with a dual purpose at once: religious and military. External inspection demonstrates the obvious defensive image of churches in Plomion, La Bouteille, Saint-Algis, Malzy, Esqueheries, Beaurain. We believe that all these churches were constructed at the end of XVI and in the first half of the XVII-th centuries of which are characteristic idle time, without cross aisle, the nave (except for Plomion) extended at the expense of a tower and with turrets on corners. Primitive windows of a nave and choruses which traces still can be observed very small and are located very highly, under eaves. Entrance door low and narrow. In walls, at the level of human growth, loopholes for frontal and firing are often punched. The angular towers beginning from a heel or a ledge (a false arch) provide the flanks distributed on several adjacent fighting offices. The most important part is always the tower located over choruses or on a church porch. The author consider that installation of a tower on choruses usually characterizes financial aid of clergy and large collectors of tithe while towers on a church porch work of the commune of inhabitants. The defensive organization of these towers is similar to the organization of donzhon which we described above. A series of obstacles delays storm of this last shelter. In Englancourt access is upward provided by means of the narrow and low direct ladder under an abrupt bias getting into thickness of a wall of choruses. It is the same type of a design, as in La Herie. Pass width on it is intended for one person. Thus, advance attacking initially was limited. Observation and protection of a ladder is skillfully carried out from a loophole for the hinged firing done in the direction of rise through a turret wall from the flank. Any who will step into a ladder will appear under fire of the shooter who settled down above, and at defeat fallen will partition off pass for the following entraining them during falling. In Plomion it is a trap which allows to shoot pass in halls shelter on the second floor. In Lerzy the door to the top room could be partitioned by the beam advanced in thickness of a wall, adaptation which we already described, speaking about protection of a door of church in Prisces. Usually two angular turrets provide flanks

of a «donzhon». If the tower on a portico (church porch), then protection of gate is supported with the concentrated fire from the numerous loopholes located on turrets of churches Plomion and Wimy at once. In 1977-1978 group of archaeological researches Tyerasha (GRAT) conducted examination of 42 loopholes of a donzhon of the strengthened Plomyona church. Embrasures distributed on ten main lines of defense: 3 levels of the southern turret with the guard house, a ladder of a northern turret, in the small «room safe» arranged in the thickness of a northwest buttress and 2 levels of loopholes for protection of flanks in the basis of a donzhon. The comparative analysis of forms of loopholes in Plomyona and in Byurel, revealed a typological variety of loopholes embrasures in their obvious connection with functions and posts of observation and points of firing from easy firearms (muskets and guns). Specialization of forms of loopholes of each level of the southern tower is opposite to a variety of embrasures of a ladder tower. It is possible to note the fact that the loopholes covering flanks are calculated on maintaining hinged fire from a short distance. The loopholes located at height of human growth at a foot of a turret and a «donzhon» possess the weakest elevation marks, slopes of a parapet and covers, but these parameters increase in process of advance on a tower further and up. The tilt angle of the direction of firing is also closely connected with the provision of loopholes embrasures in the building, i.e. with the needs to observe and convenience of firing. Traces from numerous bullets around openings of loopholes and in embrasures, on slopes of parapets and on an emphasis demonstrate attacks to which the church in the course of military occupations of the area by foreign troops was exposed that is confirmed by records in archives. [5., 60]

Conclusions. On the basis of the material stated in article it is possible with big degree of probability to assume the following: 1. Development of morphology of protective arms as result, first of all, of special design activity depends not only on development or improvement of the equipment and technologies, but also on addition of the general religious and cultural background of an era. Military need becomes that driving factor of development of design (in his modern understanding) which always influenced and influences the level of military hardware. At the same time among the people standing on different levels of the public and cultural organization, but being at one level of production and technological development the identical or equal level of technological armament in case of the military conflicts is almost always reached. In turn, the cultural and historical background inevitably has an impact on development of ideological and art programs of shaping of this era in general, and protective arms in particular.

2. Owing to historical conditions of development of firearms, during an era of almost continuous wars since 1515 po1715, on border of Picardy and Champagne, the urgent need specially arose to strengthen cult Christian constructions (keepers of relics and values) which thus became strong fortification points in the general system of defense of northern borders of France. Characteristic of all strengthened churches is existence of powerful unapproachable walls and the bell tower in the form of the fort-«donzhon» which is often surrounded with several angular towers. The thickness of walls of churches is cut through by the loopholes embrasures allowing to fire from firearms. It is remarkable that the organization of these buildings is always proved by tactical feature: the place and position of church in the village, the approach and an entrance on the cemetery, providing the flank of a door, walls of a tower-«donzhon» and nave. Strengthening is often complemented with other fortification devices in addition to protective and religious function. Owing to the special importance the strengthened «eglises fortifies» churches of this region have powerful dynamics to further improvement of architectural and fortification schemes. This dynamics keeps trends, both in respect of fortification, and in respect of composite and iconographic schemes of development of typology «eglises fortifies» of the region. [5.]

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DIAGNOSTIC INDICATORS BEFORE AND AFTER TRAINING WITH DOCTORS OF VARIOUS SPECIALTIES FOR THE EARLY DIAGNOSIS OF SKIN MELANOMA IN THE FORMAT OF INDIVIDUAL TRAINING

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The article tells about changes in the indicators of sensitivity, specificity, accuracy of diagnosis of skin melanoma before and after training with doctors of various specialties according to the author's method. It was concluded that a differentiated approach is needed when choosing a training format and a careful selection of specialists in the training group.

Keywords: skin melanoma, training in the diagnosis of skin melanoma, the author's training methodology, early diagnosis of skin melanoma

Introduction

Skin melanoma is one of the most malignant tumors among other skin tumors, since constituting structurally no more than 10% of all forms of skin cancer, it is responsible for 80% of deaths occurring in this group of tumors (Demidov L.V., Kharkevich G. Yu., 2003). Many authors note that the facts of the late diagnosis of melanoma can be explained not only by an underestimation of the signs characterizing the background precancerous neoplasms and early stages of tumor development; difficulties in conducting differential diagnosis with other melanocytic formations; lack of cancer alertness, both in doctors and in patients (Chervonnaya L.V., 2005; Baade P, Coory M., 2002).

Purpose of the study

Evaluate the training opportunities for the diagnosis of skin melanoma of specialists of various levels in the format of individual training. Tasks - evaluate the sensitivity, specificity and accuracy of diagnosis. As a result, data were obtained that the greatest increase in knowledge was shown by students, physicians, therapists, gynecologists, due to the fact that they are less likely to encounter skin melanoma in their practice.

Material and research methods

This method of training included intensive work with subjects. For a more in-depth study of the issue of reserves for training specialists in the framework of continuing medical education, an author's course on "Early diagnosis of malignant neoplasms of the skin" was developed and conducted, implemented on the basis of NGEI HE REAVIZ Medical University. The course included 72 hours of classes, which gave 36 educational credits to the tested doctor. It included entrance control using the author's program (certificate № 2018613017), lectures, demonstrations of clinical cases of skin melanoma, both within the framework of my admission in the advisory department № 1 on the basis of SOKOD GBUZ, and using the author's database (patent № 2018620399), at the end, exit control was carried out. For this, case technologies were used (D. Kalinin, 2014). Within its framework, various specialists were trained - oncologists, dermatologists, surgeons, therapists, gynecologists, 6th year students. A total of 76 people were trained; the most numerous group of students were therapists - 13.16%; oncologists accounted for 9.21%; gynecologists 5.26%; dermatologists 6.58%; the largest group were 6th year students of REAVIZ Medical University - 65.79%. Criteria - sensitivity, specificity and accuracy of diagnosis before and after training.

Results of the study

In total, 50 cases with SM and 50 cases with other benign skin tumors were presented during the entrance control.

The results of the final test were compared with the initial ones. The comparison results are shown in table 1.

Table 1.
Individual training. Average input and output parameters of diagnosing skin melanoma.

General characteristics of the group	Doctors (without students)		
	sensitivity	specificity	accuracy
Input diagnostic parameters	58,54%	64,15%	61,34%
Output diagnostic parameters	83,71%	83,49%	83,60%

To identify diagnostic capabilities, training reserves, the “weak link”, diagnostic indicators were studied depending on the subject’s specialty. The results are presented in table 2

Table 2

Individual training. Stage of incoming control. Ranking of the possibilities of diagnosing SM in subjects depending on their specialty.

specialty	diagnostic parameter		
	sensitivity	specificity	accuracy
oncologist	66,86%	78,00%	72,43%
therapist	44,60%	49,40%	47,00%
gynecologist	43,50%	52,00%	47,75%
dermatologist	79,20%	77,20%	78,20%
6 year student	12,96%	49,00%	30,98%
Average among doctors	58,54%	64,15%	61,34%
Average of total	49,42%	61,12%	55,27%

The lower value of average indicators, in comparison with other specialists, is explained by the fact that such specialists as gynecologists, therapists, who rarely encounter pigmented tumors in their routine practice and do not have sufficient knowledge in this specialized field, were not present at the training on early diagnosis of SM. However, the largest increase in knowledge was shown by students, physicians, gynecologists.

When analyzing the results of entrance testing, the difference between doctors of different specialties is noteworthy. The output control stage is presented in table 3.

Table 3

Individual training, exit control. Subjects ranking by specialties

specialty	diagnostic parameter		
	sensitivity	specificity	accuracy
oncologist	80,86%	87,14%	84,00%
therapist	86,40%	69,60%	78,00%
gynecologist	74,00%	82,00%	78,00%
dermatologist	93,60%	95,20%	94,40%
6 year student	80,16%	80,04%	80,10%

Average among doctors	83,71%	83,49%	83,60%
Average of total	83,00%	82,80%	82,90%

Discussion of the data

This training model has a number of obvious advantages. It provides a significant increase in competence in the diagnosis of melanoma, including among general practitioners or therapists who do not have much experience working with tumors of external localizations, and even students who do not have any clinical experience. The experience of training with the use of a diagnostic training simulator can be extended to tumors of other locations, remote learning is possible.

The disadvantage is a significantly greater expenditure of time and other material and intangible resources required for training, a sufficiently long distraction of doctors from their main work.

Conclusions

1. In the course of individual training, higher results are achieved in comparison with the format of the master class, although it is more costly.

2. The greatest increase in knowledge was shown by students, physicians, gynecologists. This is due to the initial low level of knowledge.

3. A differentiated approach is required when choosing a training format and a careful selection of specialists in the training group.

RESULTS OF CORONARY BYPASS GRAFTING OF ISCHEMIC HEART DISEASE PATIENTS WITH THE REDUCED MYOCARDIAL CONTRACTILITY COMBINED WITH DIABETES MELLITUS [1]

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This article presents the results of surgical treatment of IHD with severe stenotic atherosclerosis of the coronary arteries based on a retrospective analysis. 130 patients operated in our center were analyzed. All patients had reduced myocardial contractility (mean ejection fraction was 45%). All patients underwent myocardial perfusion scintigraphy analysis. It was noted that adequate myocardial revascularization in the presence of a sufficient amount of hibernated myocardium leads to a significant reduction in perfusion defect, which indicates the restoration of the hibernated myocardium.

Keywords: coronary heart disease, coronary artery bypass grafting, low contractile ability of the myocardium.

Introduction. Coronary heart disease remains the dominant pathology among diseases of the cardiovascular system. The most radical way of treating patients with coronary heart disease is known to be surgical myocardial revascularization (3,4,7).

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In recent years, due to the proliferation of endovascular methods of treatment, the contingent of cardiac surgery departments has changed significantly: the number of patients with critical multivascular damage to the coronary arteries, the so-called "compromised distal bed," has increased. The expansion of indications for CABG led to the fact that the percentage of complicated forms of IHD increased in the morbidity structure among candidates for surgery: acute coronary syndrome, extensive cicatricial myocardial changes, concomitant valvular dysfunction of the heart, severe circulatory failure (1,8,10).

There is also an increase in the number of patients with severe concomitant pathology: diabetes mellitus, a malignant course of arterial hypertension (AH) with damage to target organs, multifocal atherosclerosis, cerebrovascular disease, and renal failure [2].

Recently, the defining surgical tactics in IHD has been the "complete" myocardial revascularization, in which the number of formed shunts is not less than the number of affected coronary arteries. To control the quality of mammary-coronary, coronary artery bypass grafting and stenting of the coronary arteries, it is possible to use endovascular techniques that require hospitalization and preparation of patients for examination (6,7,11). Existing methods for assessing blood flow velocity by shunts (ultrasound and electromagnetic flowmetry) allow only indirectly assess the adequacy of myocardial revascularization. Moreover, this assessment is very conditional. An ideal way to assess the adequacy of the performed anastomoses and the completeness of myocardial revascularization could be the method of intraoperative coronarography (5,9,15). It allows real-time monitoring of perfusion zones through each shunt as anastomoses are performed and to determine the presence of intra and intersystem collaterals, as well as assess the quality of performed anastomoses (8,12,14). Thus, a truly adequate revascularization can be achieved when blood flow is restored throughout the myocardium. An alternative method for examining the quality of revascularization may be myocardial perfusion scintigraphy, which is also possible on an outpatient basis.

Purpose of the study – study of the quality and reliability of myocardial revascularization, assessment of patency and functional viability of mammary-coronary and aortocoronary shunts in the early postoperative period.

Material and methods. The work is based on a retrospective analysis of the results of surgical treatment of 130 patients with coronary heart disease who were in the IHD department and its complications of our center over the past year. 130 patients with severe stenotic atherosclerosis of the

coronary arteries were operated on. Female patients made up 16 people (13%), male patients 114 people (87%). Age ranged from 40 to 72 years, the average age was 52.5 + 7.2 years. All patients had a long ischemic history, suffered one or more myocardial infarction. 120 patients had angina of the II – III functional classes, 6 patients had unstable angina, and 2 patients had angina of the IV functional class. 86 patients had a concomitant pathology - hypertension, 30 patients had type II diabetes mellitus, a state of drug subcompensation.

For all patients in the preoperative period, we haave collected medical history and patient complaints, examinations: electrocardiogram, Holter monitoring, selective coronary ventriculography and shuntography, Echo, perfusion scintigraphy before and after the surgical period, load - rest to assess perfusion and contractility of the myocardium and its differentiation. (ischemia, hibernation, scar) in hypoperfused areas. According to Echo in the preoperative period, the average EDV LV was 175.5 + 48 ml, the average EF LV - 45.8 + 5.1% (*Table* 1). In 8 patients, aneurysm of the left ventricle was revealed. According to perfusion scintigraphy, all patients showed defects in myocardial perfusion of varying severity, the average perfusion defect was 41% + 9.6.

Table 1
Patient characterization

Indicator	Number and proportion of patients
Suffered macrofocal Q - MI	30 (23 %)
Suffered microfocal not Q - MI	112 (86,1 %)
Unstable angina	6 (4,6 %)
Angina pectoris: FC II – III FC IV	92 (70,7 %) 2 (1,5 %)
Type II diabetes	30 (23 %)
Hypertonic disease	86 (66,1 %)
Postinfarction Aneurysm LV	8 (6,15 %)
Ejection fraction (EF)	45,8 $\pm$ 5,1 %
End Systolic Volume (ESV)	68,3 $\pm$ 5,1 %
End-diastolic volume (EDV)	165,5 $\pm$ 48,5 %

Localization of foci of hypoperfusion in all patients coincided with angiographic data. The area lesion in all segments of the anterior wall and apex was noted in 100% of cases, in septal segments from 47 - 69%, in lateral segments from 27 - 43%, in segments of the lower wall from

14 - 37%. According to coronary ventriculography, subtotal stenosis of the LCA trunk is 17%, proximal stenosis of the right coronary artery - 27.4%, multiple lesions of the right coronary artery - 23.7% and three-vessel lesion - 87%. All operations were performed using multicomponent anesthesia under cardiopulmonary bypass and pharmacological cold cardioplegia. All affected coronary arteries were shunted. When performing coronary bypass surgery, 10 patients were imposed - 4 shunts, 60 patients - 3 shunts, 48 patients - 2 shunts, 8 patients - 1 shunt. The anterior interventricular branch of the left coronary artery was bypassed in 94% of patients, the right coronary artery in 68% of patients. The envelope branch of the left coronary artery was bypassed in 66% of patients, the diagonal branch of the left coronary artery in 38% of patients, the intermedia artery in 15% of patients (Table 2). The total number of shunts per patient was 3.2 + 0.9.

Table 2

Surgeries, performed on patients with IHD

Shunted coronary artery	LAD n (%)	RCA n (%)	LCX n (%)	DB n (%)	IA n (%)
The number of distal anastomoses	122 (94 %)	88 (68 %)	85 (66 %)	49 (38 %)	19 (15 %)

In the postoperative period, on average, control echocardiography and perfusion myocardial scintigraphy were performed on days 6–7 (Table 3). After the performed surgical intervention, the results of Echo showed a positive dynamics of left ventricular contractility. There is an increase in EF LV to 49.5 + 5.7, a decrease in EDV by 17% (135.1 + 25 ml).

Table 3

Comparative characteristics of indicators of Echo

Indicator, unit	Before surgery (n = 90)	After surgery (n = 90)	P
EDV, ml	165,5 $\pm$ 48,8	135, 1 $\pm$ 25,9	P < 0,001
EF, %	45,8 $\pm$ 5,1	49,5 $\pm$ 5,7	P < 0,001

One of the most reliable research methods for assessing myocardial blood supply at the microcirculation level is myocardial perfusion scintigraphy (MPS). According to MPS, in the presence of a sufficient amount of hibernated myocardium, a decrease in perfusion defect reduction by 14.2 + 5.7% is noted. Myocardial perfusion scintigraphy is a radioisotope research method designed to assess myocardial blood supply at the level of microcirculation. The method is based on assessing the distribution in

the heart muscle of an intravenously administered radiopharmaceutical (RP), which is included in intact cardiomyocytes in proportion to coronary blood flow.

Regions of the myocardium with normal blood supply create a picture of a uniform distribution of RP, and areas of the myocardium with a relative or absolute decrease in blood flow due to ischemia or scarring have a decrease in RP inclusion due to perfusion defects. The distribution of RP in the myocardium depends both on perfusion itself and on the integrity of the sarcolemma and the preservation of cellular metabolism.

To date, the method of perfusion scintigraphy has already firmly entered into clinical practice in our department, and is used in the preoperative and postoperative period in patients. All patients with IHD after coronary artery bypass grafting according to scintigraphy showed improvement in myocardial perfusion.

Conclusions

Coronary bypass surgery is an effective method of myocardial revascularization in patients with cicatricial lesion of a significant part of the myocardium and an initially low ejection fraction. Non-invasive diagnostic methods have a high degree of reliability in determining the patency and functional viability of coronary shunts in patients with IHD. According to the MPS, after coronary artery bypass grafting with a sufficient number of hibernated myocardium, a significant decrease in perfusion defect is observed, which indicates the restoration of the hibernated myocardium. In the presence of a viable dysfunctional myocardium, these patients should undergo one or another revascularization procedure - coronary artery bypass grafting, coronary angioplasty.

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THE FIRST EXPERIENCE OF SURGICAL TREATMENT OF THE ASCENDING AORTA GIANT ANEURYSM[1]

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This article presents our first experience in the surgical correction of a giant aneurysm of the ascending aorta. All stages of the operation are given. The results of the immediate and distant postoperative period are presented.

Keywords: Ascending aorta aneurysm, surgical treatment, MSCT angiography.

Introduction

Aneurysm of the ascending aorta is a life-threatening disease that leads to complications such as rupture, acute aortic dissection, and aortic valve insufficiency. Surgical treatment of patients with ascending aortic aneurysm with concomitant aortic valve insufficiency (AV) is still an urgent and unresolved problem (2).

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The main etiological factors of aneurysms and dissection of the ascending aorta include arterial hypertension, nonsyndromic and syndromic (Marfan, Ehlers-Danlo, Loyes-Ditz, Shereshevsky-Turner, Gzel-Erdheim syndromes) connective tissue dysplasia, atherosclerotic and degenerative processes, infectious lesions (syphilitic, mycotic), autoimmune diseases (giant cell aortoarteritis), nonspecific aortoarteritis. (1,11).

The main triggers and factors of excessive load on the aortic wall include high blood pressure, pheochromocytoma, the use of stimulating drugs (cocaine), injuries (including auto-injuries and falls from a height), weight lifting and excessive straining, aortic coarctation, pregnancy, iatrogenic dissection during endovascular or open cardiac surgery (15).

According to several authors, the incidence of thoracic aortic aneurysms in the population averages 0.16–1.15% (4).

In developed countries like the United States, thoracic aortic aneurysm is the main disease affecting the aorta, causing death in 15 thousand people annually (12).

According to the results of studies at the Mayo Clinic (USA), the main prognostic factor for an unfavorable outcome is the size of the aneurysm: in a patient with a maximum aortic size greater than 6 cm, there is a risk of rupture, dissection or death within a year - up to 14% (12).

While, according to IRAD (International Registry of Acute Aortic Dissection), the diameter of the aorta itself is not determinative, and there are other factors that cause complications in aneurysm of the ascending aorta. (13).

The first radical operations for aneurysms of the ascending and thoracic aorta were performed against the background of a dissecting aneurysm. The operations proposed at the dawn of the development of aortic surgery consisted in resection and replacement of the site of the stratified ascending aorta with synthetic or biological materials, in combination with the restoration of AV competence, by fixing its stratified commissures (5, 10). However, due to the lack of a differentiated approach at that time, when using this type of surgical treatment for aortic dissection, the results of the operation were unsatisfied. In 1968, the London surgeons H. Bentall and A. De-Bono developed a technique consisting in prosthetics of the ascending aorta and aortic valve with a valve-containing conduit, and in 1978 and 1986 its subsequent modifications were developed by cardiac surgeons Cabrol C. and Kouchoukos N.T., respectively. (6, 8).

But these methods, taking into account all the advantages, have a whole range of disadvantages, despite the satisfactory results that are currently being demonstrated.

A group of cardiac surgeons, led by T David (1992) and M Yacoub (1993), proposed their methods of valve-preserving prosthetics of the ascending aorta, including those with dissecting aortic aneurysm, which, despite the data on identical changes in AV flaps and aortic walls, have good long-term results (7). The superiority of the proposed operations lies in the preservation of native AV flaps, as a result of which there is no need for anticoagulant therapy (which is important for patients over 65 years of age and women of childbearing age) and specific complications associated with any type of AV prosthesis are eliminated.

According to the recommendations for the diagnosis and management of patients with aortic disease, at present, the most promising is the preference for maintaining AV in case of involvement of the aortic root in the dissection process. In this case, either supracoronary prosthesis of the ascending aorta with concomitant root reconstruction or AV preservation with prosthetics of the Valsalva sinuses should be performed (9).

In the absence of aneurysm and an intimal defect in the region of the aortic root, but in the presence of pathology of the AV valves, separate prosthetics of the tubular part of the ascending aorta and AV are shown (3).

Case from practice

Patient I., female, born 1988, was admitted to the IHD department with a diagnosis:Aneurysmal expansion of the ascending aorta. Aortic valve insufficiency III deg. From concomitant: Hypertension III deg. Arterial hypertension 3 Obesity III deg. (BMI = 41 kg/m^2).

Complaints at admission: stitching pains in the heart, palpitations, headaches, dizziness, nausea, feeling of lack of air, general weakness.

From the anamnesis: the diagnosis was made in 2013. Over the past 6 years, she took conservative treatment and was regularly observed by a cardiologist at the place of residence. Over the past two weeks, she noted a sharp deterioration in the general condition, in the form of an increase in the above complaints.

Examination: clinical and biochemical analyzes within normal limits. On an ECG: Sinus rhythm. HR 100 bpm in minutes EAH is rejected to the left. LVH. On Echo: EDV - 262.0 ml., ESV - 120.0 ml., SV-142.0 ml., EF - 54%. AoV: regurgitation III deg. The aortic diameter at the valve level is 2.4 cm, at the salsus level of the valsalva 3.48 cm, at the level of the aortic arch 5.4 cm. Concl.: Aneurysm of the ascending aorta with an arc grab. Maximum expansion in the sinotubular projection up to 10cm.

MSCT angiography of the heart and major vessels: Aorta dimensions: at the valve level - 26mm, starting from the level of the aortic bulb to the level of the arc, aneurysmal lumen expansion is determined to 10.0cm, at

BCA level - 43mm, aortic arch - 28mm, at the isthmus level - 20mm, at the aperture level - 21mm. (Figure №1).

The operation was carried out as planned.

Course of operation: A longitudinal sternotomy was performed, the pericardium was opened, during the revision, an aneurysm of the ascending part of the aorta with a diameter of up to 11 cm was visualized, which pushed down adjacent organs (FigureNo2). Cannulation of the femoral artery, right atrium (Figure №3).

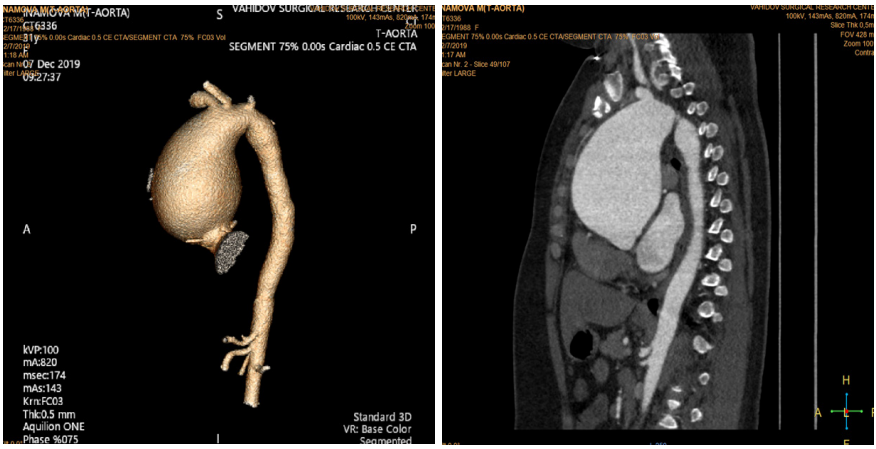

Figure №1 – MSCT angiography of the ascending aorta

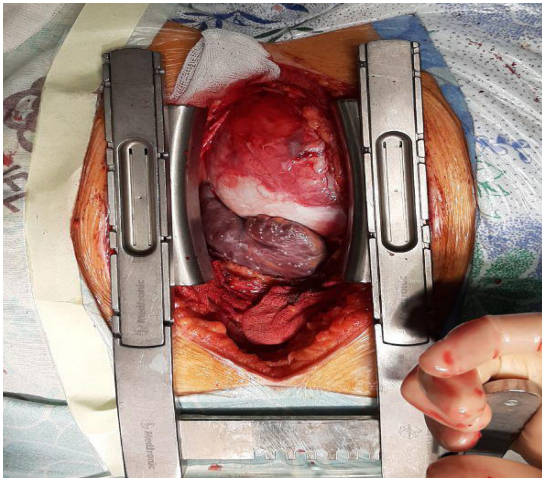

Figure №2 – aneurysm of the ascending aorta (intraoperative view).

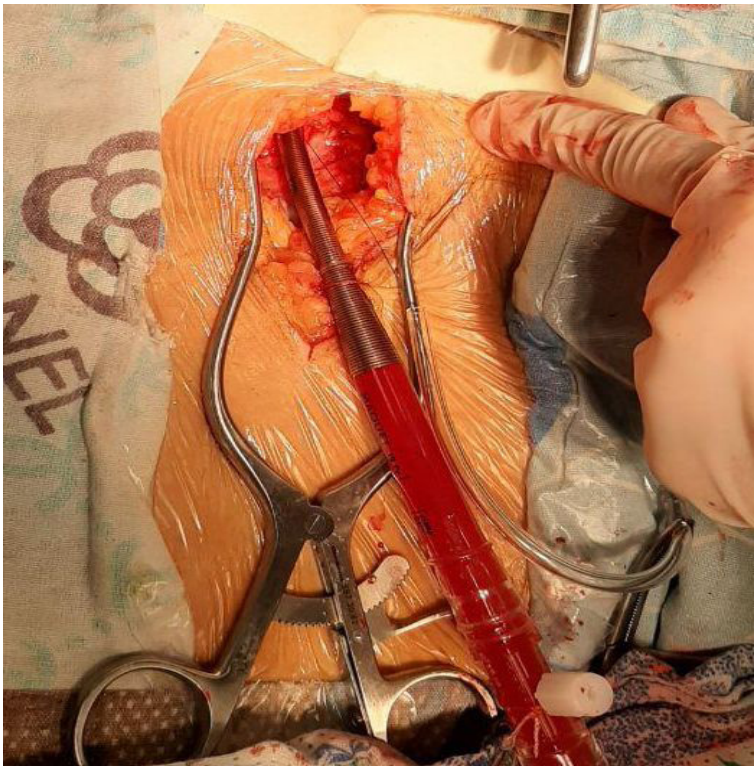

Figure №3 – femoral artery cannulation.

The aneurysm zone is covered by an adhesion process. With technical difficulties, the ascending part and the aortic arches were mobilized. Phased cardiolysis. Aortic clamp 1 cm below the brachiocephalic artery (BCA). The ascending aorta, a selective antegrade cardioplegia at the mouth of the RCA and LCA, is sloping open. Asystole. The aortic root is not dilated. On esophageal Echo: aortic valve insufficiency up to III deg. After the transverse clamp is applied, a 1 cm step will is resected. The proximal end is resected above the mouth of the coronary arteries. Further, the flaps of the aortic valve are dissected, 12-P-shaped Etibond 2/0 sutures with Teflon gaskets supraannularly laid and the "St. Jude №25" mechanical aortic valve is implanted in the aortic position (Figure №4).

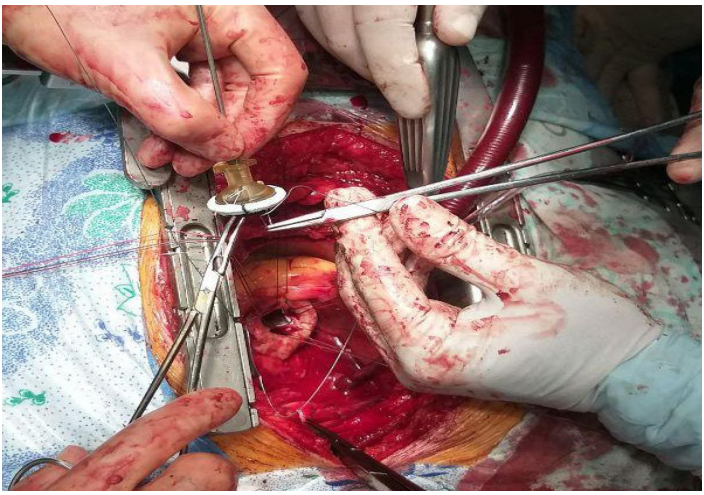

Figure №4 – aortic valve replacement.

The next step is the proximal and distal anastomosis with the VASCUTEK vascular prosthesis (d-30mm) and the “Proline 4/0” thread with a continuous upset stitch (Figure №5). Figure №6 shows the final type of operation.

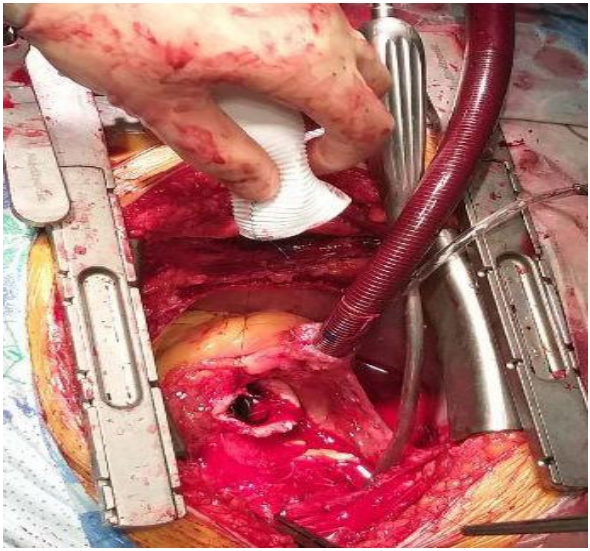

Figure №5 – vascular prosthesis implantation

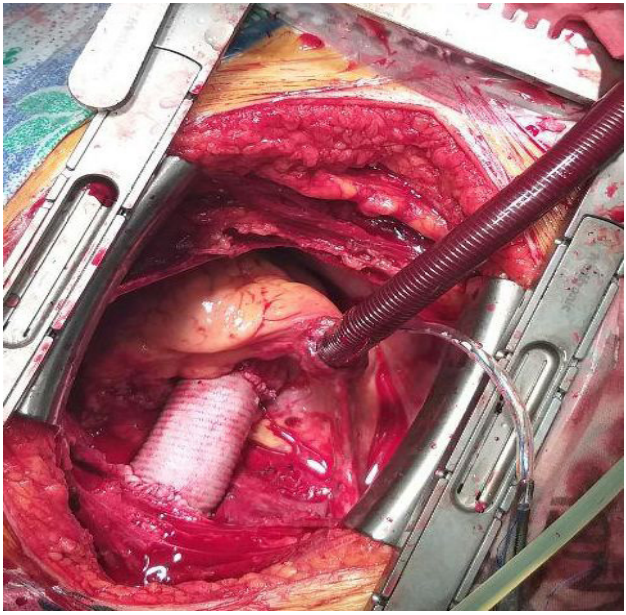

Figure №6 – final state of the operation

After the prevention of air embolism, the clamp was removed from the aorta. Phased exit with CPB. Protamine. Hemodynamics is stable. B/P 100/70 mmHg, HR 80 beats per minute. The myocardial electrode is hemmed to RA and RV. Mediastinal drainage with two separate tubes. Approximation of the sternum. The wound is sutured in layers. The patient in a stable condition was in intensive care. On the second day after the operation, transferred to the department. The postoperative period was relatively smooth, healing on postoperative wounds by primary intention. On control Echo: EDV 192.0ml ESV 100.0ml SV 92.0ml EF 48%. GD on the prosthesis AoV: 10 mmHg The patient was discharged on the 6th day after in satisfactory condition.

Control MSCT-angiography of the thoracic aorta was performed 4 months after surgery (data are shown in figure №7).

Conclusion MSCT – angiography, dimensions: aortic bulb – 30 mm, ascending aorta (prosthesis) – 33 mm, aortic arch – 40 mm, at the level of the isthmus – 20 mm, at the level of the diaphragm – 22 mm.

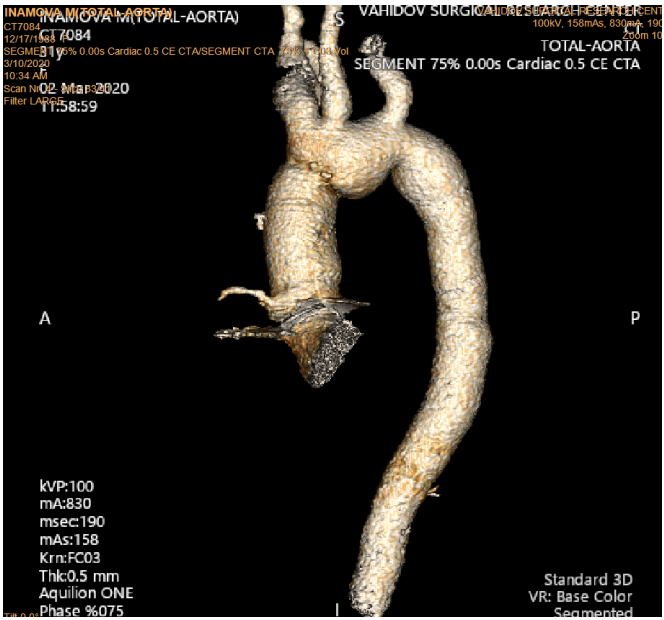

Figure №7. MSCT angiography of the thoracic aorta.

Thus, in the presence of large and gigantic aneurysms of the ascending aorta, its surgical correction shows good results in the near and distant postoperative periods, thereby reducing sudden death.

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THE DYNAMICS OF INTESTINAL MICROBIOCENOSIS IN PATIENTS WITH EXACERBATION OF PSORIASIS UNDER THE INFLUENCE OF NARROW-BAND OPTICAL RADIATION WITH WAVELENGTHS OF 540 NM AND 650 NM

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Relevance. The relevance of the work is determined by an increase in the incidence of psoriasis, an increase in the frequency of relapses, the severity of the pathological process, the absence of clear etiopathogenetic data on the occurrence of chronic dermatosis and the absence of a stable therapeutic effect.

Purpose of the study. The study of intestinal microbiocenosis in patients with exacerbation of common psoriasis under the influence of narrow-band optical radiation of 540 nm and 650 nm.

Materials and methods. *27 (13 men and 14 women) patients with*

exacerbation of common psoriasis aged 25 to 55 years were examined. The control group consisted of 116 healthy young people (66 men and 50 women) aged 20 to 35 years old, without complaints about their health, including from the gastrointestinal tract. Against the background of standard drug therapy, narrow-band optical radiation (NBOR) λ540nm and λ650nm was applied to psoriatic skin plaques from the "Spectrum LC" laser-LED therapeutic device (model 02), registration certificate for medical device dated August 25, 2016 № RZN 2016/447.

Results. *Compared with the control group, patients with psoriasis showed a marked decrease in the total number of microbial markers by almost 2 times, due to a decrease in the amount of beneficial microflora and aerobic flora. The number of microbial markers of Lactobacillus and Bifidobacterium was reduced by 3 times, Eubacterium/Cl. Coccoides by 24%. The proportion of microbial markers of Lactobacillus and Bifidobacterium was reduced by 39% and 33%, respectively, and the proportion of microbial markers of Eubacterium/Cl. Coccoides and Propionibacterium/Cl. Subterminale was increased by 54% and 89%, respectively.*

Conclusion. *The inclusion of NBOR λ540nm (green light) in standard drug regimens in patients with exacerbation of common psoriasis further stimulated the growth of Propionibacterium/Cl. Subterminale, and NBOR λ 650nm (red light) further inhibited the growth of Bifidobacterium.*

Keywords: *psoriasis, narrow-band optical radiation, intestinal microbiocenosis*

Introduction

Psoriasis is one of the most common chronic dermatoses and is considered as a systemic disease “psoriatic disease”, characterized by damage to the skin, musculoskeletal system, morphological and functional disorders of other organs and systems [1,2]. Psoriasis accounts for 14.6 to 24% of all dermatological pathologies [1].

Literary sources do not have a clear view of the etiopathogenesis of psoriasis, and the authors propose various theories of the origin of the disease. Various etiopathogenetic theories of the origin of dermatosis are considered: hereditary, autoimmune, neurogenic, metabolic, allergic, parasitic, viral, infectious, intestinal [1]. In scientific sources, the authors associate the clinical manifestations of psoriasis with degeneration of the intestinal mucosa, damage to the epithelium of the gastrointestinal tract and impaired secretion and absorption processes, which leads to the accumulation of toxic compounds that have an allergic effect and are a condition for the development of chronic dermatosis [3].

The scientific literature presents data on the relationship between intestinal microbiocenosis and psoriasis [4,5]. According to the literature, the main comorbidity of psoriasis is metabolic syndrome [6], diabetes mellitus [7], non-alcoholic fatty liver disease, etc. [8]. Of great importance in the development of non-alcoholic fatty liver disease belongs to qualitative and quantitative violations of the composition of the intestinal microbiocenosis [9].

Purpose

The study of intestinal microbiocenosis in patients with exacerbation of common psoriasis under the influence of narrow-band optical radiation of 540 nm and 650 nm.

Material and research methods

27 patients (14 women and 13 men) with exacerbation of common psoriasis aged 25 to 55 years were under observation at the SBHI "LenoblCenter". Depending on the method of therapy, all patients by randomization were divided into 4 clinically comparable groups: group I (7 patients) received standardized basic drug treatment; Group II (9 patients) received standardized basic drug treatment and narrow-band optical radiation of 540 nm (green light); Group III (7 patients) received standardized basic drug treatment and narrow-band optical radiation of 650 nm (red light); in group IV (4 patients), against the background of standardized basic drug therapy, the effect of narrow-band optical radiation was simulated. Standardized basic drug therapy was prescribed according to indications and included anti-inflammatory, hypersensitizing and detoxification therapy, antihistamines (if itching is present), hepatoprotectors and B vitamins (if indicated) and external therapy. Visible light phototherapy (photochromotherapy) was carried out by exposure to NBOR λ=540nm and NBOR λ=650nm from the laser-LED therapeutic apparatus "Spectrum LC" (model 02), registration certificate for medical device dated August 25, 2016 № RZN 2016/447.

A single examination algorithm was used: dermatological examination of the skin, collection of an anamnesis of the disease and life, assessment of the prevalence and severity of psoriasis lesions using the PASI index (The Psoriasis Area and Severity Index), standard laboratory examination, blood sampling to assess the composition of the parietal intestinal microbiota and ultrasound examination of organs abdominal cavity.

The control group of patients was 116 healthy people (66 men and 50 women) aged 20 to 35 years with no complaints about the state of health and the gastrointestinal tract.

Estimation of the composition of the near-wall intestinal microbiota by

microbial markers in the blood was determined on an "Agilent 7890 gas chromatograph with an "Agilent 5975C" mass-selective detector ("Agilent Technologies", USA). Chromatographic separation of the sample was carried out on a capillary column with a methylsilicon grafted phase HP-5ms ("Agilent Technologies", USA) 25 m long and 0.25 mm inner diameter. In 2010, Roszdravnadzor allowed its use as a new medical technology "Assessment of the microecological status of a person by chromatography-mass spectrometry" on the territory of the Russian Federation (Permit FS 2010/038 of February 24, 2010). Statistical processing of the obtained results was carried out using the statistical software package STATISTICA 6.0.

Results of the study

70.4% (19) patients had moderate severity of the psoriatic process (PASI from 10 to 20 points), and severe psoriasis severity was noted in 29.6% (8) patients (PASI more than 20 points). The main concomitant somatic pathology was: chronic gastritis, gastric and duodenal ulcer in 29.6% (8) patients; biliary dyskinesia in 25.9% (7) and pathology of the hepatobiliary system in 33.3% (9) patients.

An increase in biochemical blood tests was noted: an increase in total bilirubin in 7.4% (2) patients; AST (aspartate aminotransferase) and ALT (alanine aminotransferase) in 14.8% (4) patients; increase in thymol test in 7.4% (2) patients; increased alkaline phosphatase in 11.1% (3) patients; increased blood glucose (GL) in 14.8% (4) patients; increased cholesterol (CH) in 3.7% (1) of patients.

An ultrasound examination of the abdominal organs revealed signs of grade I-II fatty hepatosis in 51.9% (14) patients, pancreatic lipomatosis in 22.2% (6) patients, signs of chronic pancreatitis in 11.1% (3) patients, gallbladder deformity in 7.4% (2) patients, biliary dyskinesia in 14.8% (4) patients, chronic calculous cholecystitis in 3.7% (1) patients.

In patients with psoriasis, it was revealed (compared with the control group):

- pronounced decrease in the total number of microbial markers by 1.6 times (due to a decrease in the amount of beneficial microflora by 2 times);
- decrease in the coefficient of the ratio of beneficial flora to opportunistic flora by 2 times;
- decrease in the number of microbial markers of aerobic flora by a factor of 2.4 without significant differences with the control group in terms of the number of anaerobic flora;
- increase in the ratio of the coefficient of anaerobic flora to aerobic flora by 2.4 times;
- anaerobic flora was 75% (in the control group - 57%);

- aerobic flora was 25% (in the control group - 43%);
- no differences were found in the proportion of opportunistic and beneficial microflora compared with the control group (the proportion of beneficial microflora is 60%, and that of opportunistic microflora is 40%).
- significant decrease in the number of microbial markers of *Lactobacillus* by 3.3 times, *Bifidobacterium* by 3 times and *Eubacterium/Cl. Coccoides* by 24%;
- decrease in the proportion of microbial markers of *Lactobacillus* and *Bifidobacterium* by 39% (in the control group by 33%);
- increase in the proportion of microbial markers of *Eubacterium/Cl. Coccoides* and *Propionibacterium/Cl. Subterminale* by 54% (in the control group by 89%);
- decrease in the number of fungus markers, herpes markers, and cytomegalovirus below the detection limit ($x10^5$).

Table 1 shows the medians and 50% intervals of the combined indices of the parietal microbiota of the intestines of the control group and patients with psoriasis, which clearly demonstrate its features.

Table 1 - Combined statistical indicators of parietal intestinal microbiota in the comparison groups, the number of cells/g $x10^5$

Microflora indicators	Control group (n=116)		Patients with psoriasis (n=27)	
	median	50 % interval	median	50 % interval
The total number of microbial markers	64510	58210 - 73655	39389	36425 - 41574*
Useful flora, including:	31516	25838 - 36660	15620	13909 - 18374*
Lactobacillus	10758	7141 - 12834	3244	2493 - 4517*
Bifidobacterium	8085	5047 - 13820	2723	1846 - 3128*
Eubacterium/Cl. Coccoides	8488	6859 - 11523	6447	4924 - 7851*
Propionibacterium/Cl. subterm.	2800	2078 - 3888	2658	2092 - 3895
Conditionally pathogenic flora	21954	19947 - 24469	23200	20277 - 25907
UF/CPF	1,41	1,15 - 1,71	0,68	0,60 - 0,82*
Anaerobes	30441	25294 - 36264	28792	25322 - 31641
Aerobes	22876	19163 - 25904	9375	8233 - 10894*
Anaerobes/Aerobes	1,38	1,10 - 1,67	3,28	2,58 - 3,68*
Herpes	7430	5214 - 9420	0	0
Cytomegalovirus	2204	1314 - 4765	0	0
Fungi	380	286 - 509	0	0

Note: * - differences compared with the control group are statistically significant (p< 0,05).

Table 2 presents the results of the content of microbial markers in patients with psoriasis and their dynamics against the background of standard treatment. Due to the small sample of patients, there was a tendency to increase the total number of microbial markers by 20%, due to beneficial microflora by 30% and conditionally pathogenic microflora by 20%.

In patients with psoriasis (group I), after standard treatment, the following was observed:

- an increase in the number of microbial markers of *Lactobacillus*, *Bifidobacterium* and *Eubacterium/Cl*. *Coccoides* 35-38%;
- increase in the number of microbial markers of aerobic flora by 33%;
- increase in the number of microbial markers of anaerobic flora by 15%;
- increase in the ratio of the coefficient of anaerobic flora to aerobic flora by 17%.

Table 2 - Dynamics of the content of microbial markers in patients with psoriasis against the background of standard treatment (group I), the number of cells/g x10^5

Microflora indicators	n=7			
	Initial		After treatment	
	Median	50% interval	Median	50% interval
The total number of microbial markers	37312	32477-42326	45245	42124-51700
Useful flora, including:	14757	13475-19068	19355	14641-25642
Lactobacillus	3066	2516-4717	4219	3243-5790
Bifidobacterium	2506	1853-3040	3456	2624-4967
Eubacterium/Cl. Coccoides	6690	4234-8043	9035	6412-11790
Propionibacterium/Cl. subterm.	2092	1643-2480	2179	1708-3283
Conditionally pathogenic flora	21590	19002-23150	25889	21474-32067
UF/CPF	0,73	0,63-0,82	0,74	0,61-0,89
Anaerobes	28587	24723-32361	32958	28199-41481
Aerobes	8962	7635-9955	11936	8248-15503
Anaerobes/Aerobes	3,00	2,77-3,38	3,52	3,05-3,77

Note: * - differences with baseline data are statistically significant (p< 0,05).

In patients with psoriasis after inclusion in the standard treatment regimen for PCT (NBOR λ=540 nm, green light) the following was revealed:

- a tendency to increase the number of microbial markers of beneficial microflora by 23%, due to the microbial markers *Eubacterium/Cl*. 43% *Coccoides* and *Propio*nibacterium/Cl. *Subterminale* by 20%;
- increase in the number of microbial markers of anaerobic flora by 23%;
- increase in the ratio of the coefficient of anaerobic flora to aerobic flora by 31%.

Table 3 presents the results of the content of microbial markers in patients with psoriasis (group II) and their dynamics against the background of standard treatment and PCT (NBOR λ=540 nm).

Table 3 - Dynamics of the content of microbial markers in patients with psoriasis (group II) against the background of standard treatment and PCT (NBOR λ=540 nm), cell number/g x10^5

Microflora indicators	n=9			
	Initial		After treatment	
	Median	50% interval	Median	50% interval
The total number of microbial markers	39966	36676-41574	41213	39404-48507
Useful flora, including:	16023	13909-19112	19689	14599-21430
Lactobacillus	4103	3242-4517	3646	2984-4007
Bifidobacterium	2972	2733-3503	2865	2792-3584
Eubacterium/Cl. Coccoides	5026	4473-7702	7201	4459-11489
Propionibacterium/Cl. subterm.	3062	2488-4328	3660	2629-5973
Conditionally pathogenic flora	23321	20277-25850	22297	21751-28354
UF/CPF	0,74	0,57-0,84	0,80	0,65-0,96
Anaerobes	27248	26697-33007	33611	26660-39083
Aerobes	10716	9655-12141	10908	8284-12689
Anaerobes/Aerobes	2,24	2,09-3,72	2,93	2,38-4,26

In patients with psoriasis after inclusion in the standard treatment regimen for PCT (NBOR λ=650 nm, red light), the following were revealed:

- tendency to increase the number of microbial markers of *Eubacterium/Cl. Coccoides* by 40% and *Lactobacillus* by 18% amid a 30% reduction in the number of microbial markers of *Bifidobacterium*.

Table 4 presents the results of the content of microbial markers in patients with psoriasis (group III) and their dynamics against the background of standard treatment and PCT (NBOR λ=650 nm).

Table 4 - Dynamics of the content of microbial markers in patients with psoriasis (group III) against the background of standard treatment and photochromotherapy (NBOR λ=650 nm), cell number/g x 10^5

Microflora indicators	n=7			
	Initial		After treatment	
	Median	50% interval	Median	50% interval
The total number of microbial markers	37895	33336-39908	35747	31845-40835
Useful flora, including:	14081	13047-15632	15687	14380-17193
Lactobacillus	2525	2040-3363	2986	2911-3385
Bifidobacterium	2163	1659-2829	1519	754-1609
Eubacterium/Cl. Coccoides	7031	6418-7180	9865	7593-11799
Propionibacterium/Cl. subterm.	2428	2324-2767	2648	1689-2824
Conditionally pathogenic flora	22334	17371-25015	20850	19147-21367
UF/CPF	0,65	0,58-0,72	0,73	0,67-0,97
Anaerobes	29209	25630-30252	25752	25091-32321
Aerobes	8446	7498-9225	8514	7755-9890
Anaerobes/Aerobes	3,42	3,10-3,59	3,50	2,93-3,80

In patients with psoriasis after standard treatment and imitation of PCT (placebo), the following were revealed:

- a tendency to increase the number of microbial markers of *Propionibacterium/Cl. Subterminale* by 76% against the background of a decrease in the number of microbial markers of *Lactobacillus* by 50% and *Bifidobacterium* by 37%;
- reduction in the number of microbial markers of aerobic flora by 30%;
- increase in the ratio of the coefficient of anaerobic flora to aerobic flora by 23%.

Table 5 presents the results of the content of microbial markers in patients with psoriasis (group IV) and their dynamics against the background of standard treatment and imitation of PCT (placebo).

Table 5 - Dynamics of the content of microbial markers in patients with psoriasis on the background of standard treatment and imitation of PCT (group IV), the number of cells/g x10^5

Microflora indicators	n=4			
	Initial		After treatment	
	Median	50% interval	Median	50% interval
The total number of microbial markers	41015	39981-43459	37347	36245-37876
Useful flora, including:	17083	16090-18577	16210	15318-17082
Lactobacillus	4633	4105-5200	2323	1706-3191
Bifidobacterium	2500	1436-3473	1665	1489-1736
Eubacterium/Cl. Coccoides	6694	4534-8563	6684	6586-7083
Propionibacterium/Cl. subterm.	3148	2502-4746	5546	4677-5936
Conditionally pathogenic flora	25082	23316-26605	20717	20055-21456
UF/CPF	0,71	0,66-0,76	0,73	0,71-0,83
Anaerobes	30888	28744-33168	29609	28420-29957
Aerobes	11174	10163-12411	7912	7825-8001
Anaerobes/Aerobes	3,06	2,36-3,57	3,75	3,59-3,79

Conclusions

In patients with psoriasis compared with the control group, the following was revealed:

- a pronounced decrease in the total number of microbial markers by almost 2 times, due to a decrease in the number of beneficial microflora and aerobic flora;

- 3-fold reduction in the number of microbial markers of *Lactobacillus* and *Bifidobacterium*, *Eubacterium/Cl. Coccoides* by 24%;

- a decrease in the proportion of microbial markers of *Lactobacillus* and *Bifidobacterium* by 39% and 33%, respectively;

- reduction in the proportion of microbial markers of *Eubacterium/Cl. Coccoides* and *Propionibacterium/Cl. Subterminale* was increased by 54% and 89%, respectively.

2. In patients with psoriasis against the background of standard treatment, the following was revealed:

- a tendency to increase the total number of microbial markers by 20%, due to beneficial microflora and conditionally pathogenic microflora;

- an increase in the number of microbial markers of *Lactobacillus*, *Bifi-*

dobacterium and *Eubacterium/CI*. *Coccoides* 35-38%;

- an increase in the number of microbial markers of aerobic flora and anaerobic flora by 33% and 15%, respectively.

3. In patients with psoriasis on the background of standard treatment and PCT (NBOR λ=540 nm, green light), the following was revealed:

- tendency to increase the number of microbial markers of beneficial microflora by 23%, at the expense of the microbial markers of *Eubacterium/CI*. 43% *Coccoides* and *Propionibacterium/CI. Subterminale* by 20%;

- increase in the number of microbial markers of anaerobic flora by 23%.

Thus, photochromotherapy (540 nm, green light) additionally stimulated the growth of *Propionibacterium/CI. Subterminale.*

4. In patients with psoriasis on the background of standard treatment and PCT (NBOR λ=650 nm, red light), the following was revealed:

- tendency to increase the number of microbial markers of *Eubacterium/CI. Coccoides* by 40% and *Lactobacillus* by 18% amid a 30% reduction in the number of microbial markers of *Bifidobacterium*.

Thus, photochromotherapy (NBOR λ=650 nm, red light) further inhibited the growth of *Bifidobacterium*.

5. In patients with psoriasis, against the background of standard treatment and simulation of PCT (placebo), there was a tendency to increase the number of microbial markers of *Propionibacterium/CI. Subterminale* by 76% against the background of a decrease in the number of microbial markers of *Lactobacillus* and *Bifidobacterium* by 50% and 37%, respectively, and a decrease in the number of microbial markers of aerobic flora by 30%.

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COMPARATIVE MONITORING OF GINGIVAL FLUID CYTOKINES IN PATIENTS WITH PERI-IMPLANTITIS DURING WITH ANTIBACTERIAL AND PHOTODYNAMIC THERAPY

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The effect of PDT on the processes of mucosal immunity, in particular on the cytokine profile, remains virtually unstudied. ***Purpose of the study****: clinical and immunological evaluation of the effectiveness of PDT in the complex treatment of peri-implantitis.* ***Materials and research methods****. The study included patients who contacted the dental institutions of the Republic of Dagestan and the clinic of the Department of Surgical Dentistry of Moscow State Medical University aged 20 to 49 years with a diagnosis of peri-implantitis, a total of 61 people. 33 patients received ABT (main group 1), 28 PDT patients (main group 2). The control group consisted of 76 patients with stable implants without signs of inflammation or periodontitis (intact periodontium). The concentration of TNF, IL-1β, IL-6, and IL-17A cytokines in the oral fluid was determined by ELISA twice using an INFINITE F50 analyzer (TECAN, Austria) and test-systems (vector-Best, Novosibirsk, Russia).* ***Results.*** *Differences were revealed in the state of the cytokine profile in ABT (amoxicillin/sodium clavulanate at 825/125*

mg 2 times a day for 7 days) and PDT (Photosan 350 apparatus, photosensitizer toluidine blue: 4 sessions every 1 day for 40 sec). The maximum cytokine response was observed when evaluating IL-1β (137-139 pg/ml) and IL-17a (161-172 pg/ml). After 1 month, statistically significant differences were revealed between groups of peri-implantitis patients receiving various treatment options. The level of TNF-α decreased by 2.5 times and corresponded to the norm in the case of PDT, but with ABT it remained significantly higher, although we also observed a downward trend. The level of IL-17a showed a statistically significant decrease in PDT, while in ABT this decrease was not significant. 3 months after treatment, in both compared groups, normal levels of TNF-α, IL-6 and IL-17a were normalized, with the exception of IL-1β, which remained elevated: 8.6 times with PDT and 25 times with ABT. ***Conclusion.*** *The cytokine profile of gingival fluid in peri-implantitis is an important diagnostic marker for the severity of inflammation, which allows you to confirm the presence of peri-implantitis and predict its course. The content of IL-1β and IL-17a reflects the severity of the process. Restoring normal levels of IL-1β is slower than IL-17A.*

Keywords: peri-implantitis, cytokine profile, photodynamic therapy.

According to existing criteria, peri-implantitis is a pathological condition associated with a microbial biofilm that occurs in the tissues surrounding dental implants. It is characterized by an inflammatory process in peri-implant tissues, mucous membrane and loss of supporting bone tissue [9,10,14]. At the World Workshop of the working group on the classification of periodontal diseases and peri-implant tissues in 2017, the characteristics of the periodontal condition in pathology were clarified and the complications of dental implantation: mucositis and peri-implantitis were clarified. In particular, mucositis is characterized as an inflammatory process of the mucous membrane around the implant, and peri-implantitis is an inflammation of all tissues around the implant with the formation of a pathological bone pocket [3,7,10].

The main objectives of the treatment of peri-implantitis and mucositis are: conducting professional hygiene, eliminating the infectious focus around the dental implant, correcting the biomechanical load on the implant, measures aimed at reducing bone destruction or reconstruction of defects and restoring microcirculation in the periodontium [1,4,5,9,14].

The virulent anaerobic bacteria *Porphyromonas gingivalis, Prevotella intermedia, Tannerella forsythia, Treponema denticola,* as well as streptococci and actinomycetes that make up the periodontal microbiome in normal and pathological conditions have been proven to be active in the

development of peri-implantitis [12,13,16]. In this regard, the traditional direction of the complex treatment of peri-implantitis is considered to be the eradication of periodontopathogenic microbiota from the microbial biofilm of the peri-implantation zone using antibacterial chemotherapy [4,5,8]. However, the effectiveness of this method is reduced due to an increase in resistance to antibiotics, including bacteria of periodontopathogenic species, which dominate with the development of peri-implantitis. In addition, the use of antibacterial drugs, in turn, often provokes a progressive increase in the population of yeast of the genus *Candida.* Considering that implantation is often performed in patients with periodontal diseases, in which, for several reasons, the contamination of fungi increases, the contribution of the latter to the development of peri-implantitis and mucositis is a subject of modern research and is actively discussed in the literature [7,12,15,16].

If the effectiveness of antibiotic therapy can be considered quite justified, then in relation to photodynamic therapy there are only a few experimental and clinical studies that have shown the possibility of sanation of the implantation zone using photodynamic exposure using various photosensitizers. The most commonly used photosensitizers are tolonium chloride and photoditazine, which provide a photochemical reaction with the formation of active oxygen and nitrogen radicals. The toxic effect of photochemical reaction products on representatives of periodontopathogenic microbiota and *Candida* yeast has been established [8,11].

However, the mechanism of influence on the immune processes, the processes of regeneration and osseointegration during dental implantation, which is realized through the cytokine network of mucosal immunity, has been studied insufficiently to date, and the available data are contradictory [6,14]. According to recent studies by researchers of this problem, the leading role in the development of complications is played mainly by pro-inflammatory cytokines - IL-1β, IL6, which should be considered as prognostically significant criteria for the normalization of the inflammatory process [4,8]. However, the role of a number of other cytokines in the pathogenesis of perimplantitis remains poorly understood.

Purpose of our study was a comparative clinical and immunological evaluation of the effectiveness of traditional antibacterial chemotherapy and photodynamic therapy in the complex treatment of peri-implantitis.

Materials and research methods. The study included patients with a diagnosis of peri-implantitis, who applied to the Central Republican Hospital of the Republic of Dagestan and the clinic of the Department of Surgical Dentistry of the A.I. Yevdokimov Moscow State University of

Medicine and Dentistry. Age group 20-50 years old, total 61 people of both sexes. Patients who had advanced cases of peri-implantitis when removal of a dental implant was necessary were excluded from the study. All patients filled out informed consent and were divided into 3 groups: the two main ones receiving antimicrobial therapy and the control group (with intact implants). Patients of the main groups 1 and 2 received one of the treatment options: antibacterial chemotherapy (ABT) or photodynamic therapy (PDT). Systemic antibacterial drugs were prescribed to patients of the main group 1 (33 patients) taking into account sensitivity to the antibiotic - in all cases it was amoxicillin/sodium clavulanate (825/125 mg 2 times a day for 7 days). Photodynamic therapy was carried out for patients of the main group 2 (28 patients) using a FotoSan 350 pulsed-action photodiode apparatus with a toluidine blue photosensitizer (4 sessions every 1 day for 40 seconds per perplantation area). The control group consisted of 76 patients with stable implants without signs of inflammation or periodontitis (intact periodontium). The study was approved by the interuniversity ethics committee of Moscow.

Along with stage studies of the dynamics of the clinical condition of the zone of the pathological process (peri-implantitis), we conducted a study of the cytokine profile of the gingival (peri-implantation) fluid. To conduct the study, gingival fluid was collected in sterile tubes in each patient twice: before the start of ABT or PDT and 1 to 3 days after the end of the course of treatment in the main groups with perimplantitis. In the control group with stable implants - once. The concentration of TNF-α, IL-1β, IL-6, IL-17A cytokines in the oral fluid was determined by ELISA using an INFINITE F50 analyzer (TECAN, Austria) and test systems manufactured by "Vector-Best" LLC (Novosibirsk, Russia).

The algorithm for the treatment of peri-implantitis included: professional hygiene - removal/cleaning of orthopedic suprastructures and revision of areas of possible violations, supra- and subgingival cleaning of surfaces with removal of the epithelium of pockets and granulation tissue, local application of disinfectants, rinsing: 0.05% solution of chlorhexidine 3-gluconate 4 times a day for 5-7 days, instructing patients to properly conduct individual oral hygiene.

Statistical processing of the results was performed using the Student t-test, with the determination of the probability of differences for the compared groups for $p < 0.05$.

Research results and discussion. Comparative monitoring of the cytokine profile was carried out in patients of the control group with stable implants (n = 76) and peri-implantitis (n = 61). The latter were divided into

2 groups: patients receiving a course of antibacterial chemotherapy (main group 1–33 patients) and patients receiving PDT sessions (main group 2–28 patients). The dynamics of changes was observed three times: before the start of treatment, 1 and 3 months after completion. The results of the assessment of the cytokine profile of the gingival fluid were as follows (table).

As can be seen from the presented data, the TNF-α cytokine, known as a signal marker of inflammation, corresponded to the norm in the control group with stable implants without signs of inflammation (0.8 pcg/ml), but was statistically significantly increased (2.89-2.92 pcg/ml) in patients with peri-implantitis before treatment. At the same time, no differences between the compared groups with PDT and ABT were noted, which indicates the homogeneity of the groups. Similar results were obtained for other pro-inflammatory cytokines - IL - 1β, IL - 6, IL - 17A. Moreover, the most pronounced cytokine response and data scatter were noted in our study when assessing the cytokines IL - 1β (137-139 pg/ml) and IL - 17A (161-172 pg/ml).

After 1 month, statistically significant differences were revealed not only compared with the control group of patients with stable implants, but also between groups of patients with peri-implantitis receiving different treatment options (PDT, ABT). Thus, the level of TNF - α decreased by 2.5 times and corresponded to the norm in the case of PDT, but remained significantly higher with antibiotic therapy, although a downward trend was also observed (by 25%). A similar trend was observed for IL - 6, which normalized completely during PDT, but remained elevated in the group with ABT. The level of IL - 1β decreased significantly, but did not reach the norm, and with PDT it decreased by 2 times more than with antibiotic therapy. The level of IL - 17A yielded a statistically significant decrease in PDT, but remained elevated, while antibiotic therapy showed a slight decrease.

3 months after treatment, complete normalization of the level of TNF-α was observed, for IL-6 and IL-17A in both compared groups, however, IL-1β still remained elevated with a significant decrease: 8.6 times with PDT and 25 times with antibiotic therapy.

Thus, in our study, new data on the dynamics of cytokines in the traditional antibacterial regimen (amoxicillin/sodium clavulanate at 825/125 mg 2 times a day for 7 days) and photodynamic therapy of patients with peri-implantitis were obtained. Monitoring of the main differences in IL - 1β and IL - 17A is presented in the diagrams (Fig. 1-2), which reflect more favorable trends in the application of photodynamic therapy compared to traditional antibacterial chemotherapy.

In the first studies regarding the role of mucosal immunity in the development of peri-implantitis, the diagnostic and prognostic role of some cytokines, mainly of a pro-inflammatory nature, was established [6]. At about the same time period, our studies showed that the intensity of the cytokine response in periodontitis has population differences, in particular, it is significantly higher in the indigenous population of Dagestan compared with residents of the Moscow region [2]. This study presents averaged data obtained also in both regions, but with peri-implantitis. Analyzing the personified data of the cytokine response, it can be argued that this tendency with peri-implantitis as a whole is confirmed and may be the subject of a separate study.

Conclusion. As a result of the study, it can be stated that the cytokine profile of the gingival fluid in peri-implantitis is an important diagnostic marker of inflammation, which allows confirming the presence, severity and prognosis of the development of this pathology. The severity (magnitude) of the response of the pro-inflammatory cytokines IL-1β and IL-17A, according to the data obtained, reflects the severity of the process. Restoring normal levels of IL - 1β is slower than IL - 17A. Comparison of the effectiveness of different antimicrobial therapy options for clinical and immunological parameters revealed that PDT has a more favorable effect on the cytokine profile compared to traditional antibacterial therapy. The results allow us to conclude that PDT is a rational and effective method for the prevention and treatment of inflammatory complications of dental implantation (peri-implantitis and mucositis).

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Table 1. The cytokine profile of patients with peri-implantitis, depending on the treatment option, pg/ml

Initial parameters before treatment				
Comparison groups / Cytokines	**Stable implants n=76 (1)**	**Peri-implantitis with PDT, n=28 (2)**	**Peri-implantitis with ABT, n=33 (3)**	**Student t-test; reliability for groups, p<0,05**
TNF - α	0,8 ± 0,5	2,89 ± 0,4	2,92 ± 0,5	t=3,26; P2/1<0,001 t=3,00; P3/1<0,003 t=0,05; P3/2=0,962
IL - 1β	3,8 ± 1,5	137,6 ± 21,3	129 ± 29,6	t=6,27; P2/1<0,000 t=4,22; P3/1<0,000 t=0,24; P3/2=0,814
IL - 6	3,7 ± 0,9	8,7 ± 1,3	7,6± 1,5	t=3,16; P2/1<0,002 t=2,23; P3/1<0,028 t=0,55; P3/2=0,582
IL - 17A	27,2 ± 15,3	161,4 ± 59,7	172,6 ± 61,8	t=2,18; P2/1<0,032 t=2,28; P3/1<0,024 t=0,13; P3/2=0,897
Parameters 1 month after treatment				
TNF – α	0,8 ± 0,3	1,2 ± 0,3	2,3 ± 0,4	t=0,94; P2/1=0.348 t=3,00; P3/1<0,003 t=2,20; P3/2<0,032
IL - 1β	3,8 ± 1,5	55,6± 11,1	112,4 ± 23,7	t=4,62; P2/1<0,000 t=4,57; P3/1<0,000 t=2,17; P3/2<0,034
IL – 6	3,7 ± 0,9	3,5 ± 1,1	7,9 ± 1,9	t=0,14; P2/1=0,888 t=2,00; P3/1<0,048 t=2,00; P3/2>0.049
IL - 17A	27,2 ± 15,3	55,1 ± 13,4	84,9± 18,3	t=1,37; P2/1=0,173 t=2,42; P3/1<0,017 t=1,31; P3/2=0,194
Parameters 3 months after treatment				
TNF – α	0,8 ± 0,5	0,6 ± 0,4	1,5 ± 0,7	t=0,31; P2/1=0,755 t=0,81; P3/1=0,418 t=1,12; P3/2=0,269
IL - 1β	3,8 ± 1,5	32,8 ± 12,6	96,2 ± 18,4	t=2,29; P2/1<0,024 t=5,01; P3/1<0,000 t=2,84; P3/2<0,006
IL – 6	3,7 ± 0,9	3,1 ± 0,4	3,4 ± 0,5	t=0,61; P2/1=0.544 t=0,29; P3/1=0,771 t=0,47; P3/2=0,641
IL - 17A	27,2 ± 15,3	33,2 ± 11,8	42,7 ± 17,1	t=0,31; P2/1=0,757 t=0,68; P3/1=0,501 t=0,46; P3/2=0,649

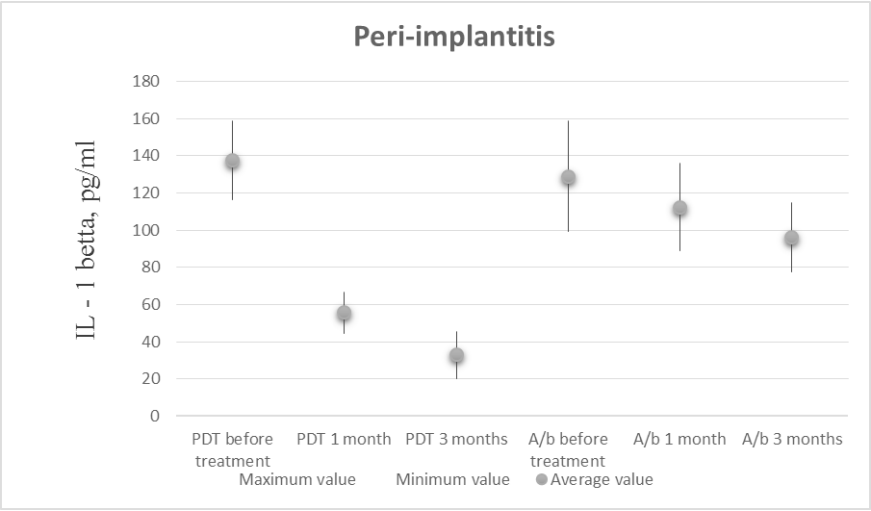

Fig. 1. The level of IL - 1β in patients with peri-implantitis with traditional antibacterial chemotherapy (A/b) and photodynamic therapy (PDT), pg/ml

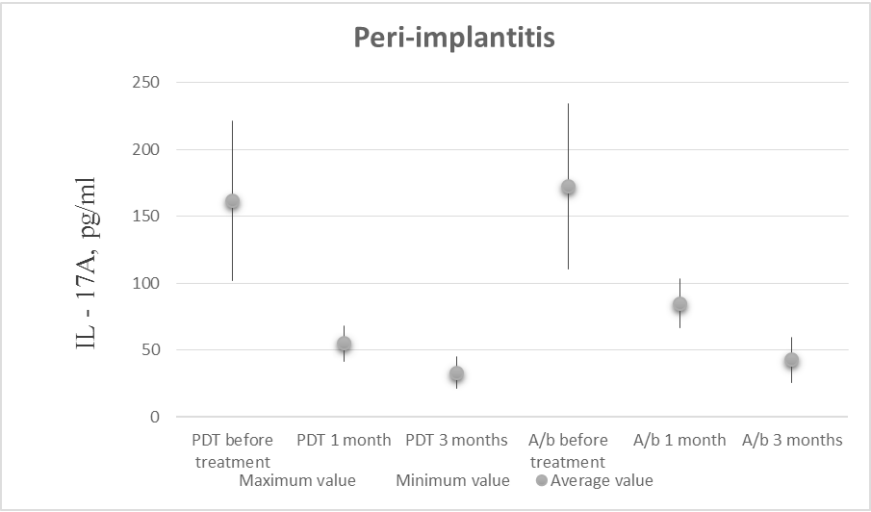

Fig. 2. The level of IL - 17A in patients with peri-implantitis with traditional antibacterial chemotherapy (A/b) and photodynamic therapy (PDT), pg/ml

APPLICATION OF PHYSICAL FACTORS IN COMPLEX ETIOPATHOGENETIC THERAPY PATIENTS WITH CORONAVIRUS-19

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Fundamental scientific research of domestic and foreign scientists strongly suggests that the progress of medicine is impossible without the widespread use of modern physical factors in the diagnosis, prevention, treatment and rehabilitation of almost all nosological forms of diseases from newborns to old age of patients.

Each micro-and macro-organism has individual bioenergetic characteristics corresponding to its type, which is the main condition for normal life activity of the organism.

In the case of "alien" bioenergetic characteristics, specific biological processes inherent in this organism are disrupted, which leads to its death [13].

The biopotential of each person is strictly individual in both normal and pathological conditions. The degree of deviation of the biopotential corresponds to the stage of development of the disease, i.e. the formation of intermediate States of the body with a violation of its supramolecular structures.

Keywords: etiopathogenetic therapy, supramolecular structures, coronavirus, COVID-19.

Natural and preformed physical factors occupy an important place in medicine of the XXI century, as they are important for the diagnosis, treatment, prevention and medical rehabilitation of patients.

Medicine should be developed according to this concept:

"The level of medical excellence determines the progress of conservative treatment of patients with any pathology other than traumatology."

Surgery should not be a factor in determining the progress of medicine. It is forced and will yield to the conservative method of treatment constantly with different speed and scale.

Based on the progress of physical and technical Sciences, it is necessary to replace the concept of "mechanism of action of the physical factor" with "mechanism of interaction of the physical factor and the whole organism".[1,4,9]

Already from the moment of contact of the physical factor and the organism, intermediate States of both sides are formed with the release of energy (for the continuation of the cyclic process).

In the Russian and world literature, we have not found scientific studies of their significance for the diagnosis, effectiveness and correction of treatment, prevention and medical rehabilitation. This is especially important in Oncology for monitoring and managing the treatment process.[3,5]

For the body, any external influence is a violation of its integrity and therefore the system of rapid disposal of it is instantly activated.

Even your own blood outside the vascular bed is a foreign body for the body. That is, there is an instantaneous transfer of the work of all organs and systems of the body to an abnormal mode.[4,5]

It should be noted that at the moment of development of medical science there are no methods for determining the time level of the cycle of each system at the time of exposure to the body of a medicinal substance, in its transition States at the supramolecular level and when all systems return to normal mode of life.[2,15]

In this regard, it is difficult to imagine the advantage of a particular drug, and in particular for a particular patient. The lack of data in the chronological sequence of the drug in its path to achieving the goal calls into question the advantages of drug therapy over physical therapy.

It is known that " the interaction of a drug with the body is studied in two aspects: how it affects the body (pharmacodynamics) and what happens to it in the body (pharmacokinetics). Pharmacodynamics studies the localization, mechanism of action and pharmacological effects of medicinal substances.[2]

Pharmacokinetics studies the patterns of absorption, distribution and elimination of medicinal substances in the human and animal bodies. [2]

At the same time, it should be noted that the speed, scale, content and time of formation of intermediate formations of a pharmacological drug in the body for each patient are strictly individual.

All drugs in interaction with the body before their introduction into medical practice, in accordance with pharmacodynamics, pharmacokinetics should be studied by fast, harmless and highly informative methods. [5]

Compliance with this concept contributes to ensuring a high therapeutic effect, primary and secondary prevention of diseases, prevention of complications and side effects on the body.

This is not observed in medical and pharmaceutical practice due to the lack of research methods for pharmacological preparations at the supramolecular level. [6]

The biopotential for each person is strictly individual both in norm and in pathology. In this regard, any nosology in each individual causes a deviation of its biopotential in accordance with the stage of development of the disease, i.e. the formation of intermediate States of the body with certain violations of its supramolecular structures.

This, in turn, determines the clinical picture at the time of examination of the patient and is the leading condition for choosing the right treatment tactics for any specialist doctor, so that the regression of the disease is accompanied by the restoration of destroyed supramolecular structures, excluding new gross violations at any level of the entire body [6,7].

This concept is not the main principle for drug therapy, due to the lack of highly informative research methods: frequency, dose, mechanism of action of pharmacological drugs at the supramolecular level.

It is known that the final characteristic of any drug at the supramolecular level is "energy", which is difficult to dose and regulate for therapeutic purposes.

The impact of energy from any physical factor is dosed and regulated (physiodynamics) using nanotechnology and its path can be freely traced to each molecule of the whole organism (physiokinetics) without disrupting supramolecular structures, without negative consequences by means of a nanosensor.(patents for inventions: Russia # 2675006, Germany # 20 2017 006 896.)

Modern pharmaceutical science does not have such a high level of control over the path of a medicinal substance in the body.

"The conversion of the energy of photons, light particles, into electrical energy takes place in several stages," explains Professor Christoph Well, head of the IFG Institute. First, light is absorbed on the surface of the light-sensitive material.[11]

Under the influence of the energy of photons of light, the electrons leave their places, leaving in their place electronic holes, with which they immediately form quasiparticles called polaritons.

These polaritons exist only for a very short time, moving to the boundaries of the material, where they break up into electrons and holes, which continue to move further on their own.

And the future fate of these charge carriers already depends on the nature of the light-sensitive material used" [11].

In this regard, any therapeutic effect on the body should be considered a trigger for restoring homeostasis, connecting its own internal systems.

After studying the officially proposed and published Russian media medicines designed to combat coronavirus-19, we have to admit not only their ineffectiveness, but sometimes even harm.

Their original assumptions are clearly wrong. In fact, physiotherapy is seen as a more appropriate approach.

It is based not only on the stated considerations, but also on half a century of experience in use.

Highly effective methods of physical therapy include:

I. light Therapy of the device "BIOPTRON".

Its spectral range-480-3400 nm-reproduces the dominant types of Solar radiation on Earth-visible and IR radiation, under the influence of which the body absorbs and uses radiant energy. Polychromatic visible and infrared polarized (PVIP) light activates the enzymes nicotinamidadenin-dinucleotide phosphate-oxidase (NADP-oxidase) and nucleotide containing biopteroflavoprotein-NO-synthesis, localized in the cell membrane and using the surrounding oxygen produce its active forms-superoxidanion, hydrogen peroxide, hydroxyl radical and nitric oxide (NO). [15]

They conduct a light signal from the surface of the irradiated cell to its nucleus, affecting specialized intracellular mechanisms for conducting the activation signal (protein phospholidation, the state of calcium channels, the content of calcium in the cell, etc.).

The enzymes responsible for the formation of ROS and NO, as themselves and intermediaries, are found in cells and tissues, in all types of white blood cells, platelets, endothelial and smooth muscle cells of blood vessels. It was found that nitric oxide-NO, is an important part of the mechanism of blood vessel dilation and platelet aggregation, without which phototherapy could hardly be highly effective.[10,14]

After daily 5-10 irradiations, the number of mononuclear leukocytes – monocytes and lymphocytes-circulating in the blood increases by 14-17%.

30 minutes after the first exposure to PVIP light, Pro – inflammatory cytokines-tumor necrosis factor (TNF – α), interleukins-IL-6, IL-2, and IL-12-disappear from the circulating blood. So, at the initial increased content of TNF-α, it falls by 30 times, IL-8 – by 4-6 times, IL-2 – by 4-10 times and IL-12-by 12 times, by the end of the course.[14,16]

Simultaneously, the plasma content of anti – inflammatory cytokines-IL – 10 and transforming growth factor-TFR-β1 increases. [14]

A feature of PVIP-light phototherapy is a rapid 6-fold increase in the blood of the most important immunomodulator – interferon-γ (IFN-γ).

The most important function of this cytokine is to activate cellular immunity (the functional state of monocytes, macrophages, natural killers and cytotoxic T-lymphocytes), which primarily increases the body's antiviral and antitumor resistance.[13]

Fig. 1 light Therapy (PVIP) performed by the "BIOPTRON-COMPACT" device-5cm.

Fig. 2 light Therapy (PVIP). The device "BIOPTRON PRO" - 11cm.

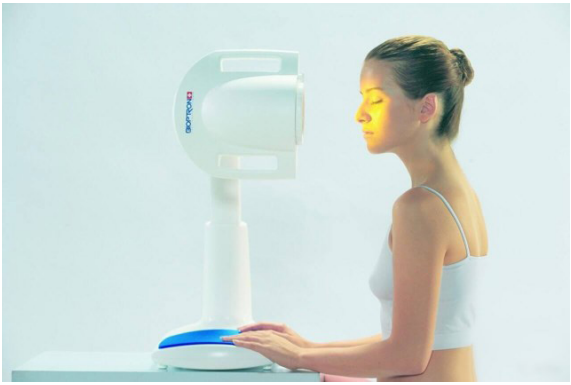

Fig. 3. Light therapy (PVIP) conducted by the Bioptron PRO apparatus - 11cm.

II. Application of dry carbon dioxide baths "Reabox".

Dry carbon dioxide baths (SUV) - a method of percutaneous therapeutic action of carbon dioxide on a patient whose body is located up to the neck level in a specially equipped box. Application (SUV) "Reabox" provides non-invasive, i.e. does not violate the integrity of the skin, the introduction of carbon dioxide, which distinguishes this method from CO2 injections. Direct action of carbon dioxide on the respiratory center. The excitation of the respiratory center is not caused by carbonic acid itself, but by an increase in the concentration of hydrogen ions due to an increase in its content in the cells of the respiratory center.

Fig. 4. Dry carbon dioxide baths using the "Reabox" device

The specificity of carbonic acid as a respiratory center pathogen was revealed by the experiments of Frederick and Holden, who found that h+ and HCO3 ions pass poorly through the cell membrane, and undifferentiated carbonic acid passes well: undifferentiated H2CO3 diffuses into the cells of the nerve center, which dissociates already in the nerve cells, releasing the irritating H+ion.

Faster diffusion into cells than other acids is a specific feature of carbonic acid, and this is associated with a stronger irritating effect on the respiratory center. [12,15]

The normal ranges of total CO2 in the blood should be as follows.

Age range	Conventional units	SI units
18–59	23–29 mEq / l	23–29 mmol / l
60–89	23–31 mEq / l	23–31 mmol / l
90+	20–29 mEq / l	20–29 mmol / l

Hyperventilation for a short time (several tens of minutes) leads to death due to the loss of carbon dioxide by the body.

Humoral regulation of respiration, the role of carbon dioxide, oxygen and blood pH in this process.

The main respiratory stimulant is CO2. Blood pH also plays an important role in the regulation of respiration.

When the pH of arterial blood decreases in comparison with the normal level (7.4), lung ventilation increases, and when the pH increases above the norm, ventilation decreases. Increasing the content of CO2 in the blood stimulates respiration both by reducing the pH and directly by the action of CO2 itself. [12,15]

The effect of CO2 and H+ ions on respiration is mediated mainly by their action on special structures of the brain stem that have chemosensitivity (Central chemoreceptors are part of the blood – brain barrier; low sensitivity threshold).

It was found that a decrease in the pH of the cerebrospinal fluid by only 0.01 is accompanied by an increase in pulmonary ventilation by 4 l / min. [15]

Lack of O2 can be a respiratory stimulant in the case of barbiturates as narcotic drugs, because in this case, the sensitivity of the respiratory center to CO2 is suppressed. Breathing pure oxygen (O2) in patients with reduced sensitivity to CO2 is very dangerous, because when the O2 volt-

age increases in the arterial blood the last respiratory stimulant (lack of O2) is eliminated in the blood and respiratory arrest may occur. In such cases, it is necessary to use an artificial respiration device.

III. Extremely high frequency therapy (EHF) is the therapeutic use of millimeter-wave electromagnetic waves.

The experience of using it for more than 30 years shows high efficiency in the treatment of a wide range of diseases, including cancer patients.

Extremely high frequencies occupy the range of 30-300 GHz (the wavelength range is 10-1 mm). The peculiarity of this frequency range is that millimeter radiation of cosmic origin is almost absorbed by the earth's atmosphere, so the biological evolution of all living organisms took place with a very small natural EHF electromagnetic background. This, apparently, explains the active influence of low-intensity millimeter radiation on a person.

The following wavelengths are most commonly used in EHF therapy: 4.9 mm (60.12 GHz), 5.6 mm (53.33 GHz), and 7.1 mm (42.19 GHz). [8]

Low-intensity millimeter radiation refers to non-ionizing radiation, i.e. it can not have a destructive harmful effect on the biological tissues of the body, and therefore it is safe.

A specific feature of EHF exposure is its normalizing nature, i.e. EHF radiation normalizes only the physiological parameters of a number of States of the body that deviate from it: it increases the values of reduced indicators and reduces the values of inflated values. Parameters that are normal do not respond to radiation of the body with a millimeter field.

That is, the features of EHF therapy as non-invasiveness, lack of Allergy to EHF radiation, drug-free therapy contribute to the normalization of intracellular energy of any cell in the whole body.

IV. Multifunctional device for spot infrared and magnetic therapy for effective pain relief (Rayforce)

IR wavelength: 850 nm. Magnet power: 1000 Gauss. Charging: from sunlight and artificial light.

IR-therapy. It is proved that waves of different ranges affect the body in different layers and levels. IR radiation has the greatest penetration depth. In physiotherapy, waves are used in the range from 780 to 1400 nm, i.e. short, penetrating the tissues to a depth of 5 cm. The effect of IR radiation is aimed at accelerating the physical and chemical processes reactions: the processes of tissue repair and regeneration are stimulated, the vascular network expands, blood flow accelerates, cell growth increases, biologically active substances are produced, and white blood cells are sent to the lesion site. The reserve functions of the body are awakened. Permanent magnetic field (PMP) improves microcirculation, stimulates healing

processes, activates immunological reactions, has anti-inflammatory and sedative effects.[17] Experimental studies were conducted at the scientific center for fiber optics (ncvo) of the Russian Academy of Sciences, Moscow. New non-toxic, non-hygroscopic silver halide light guides with low optical losses in a wide spectral range of 3-15 microns have been developed by the ntsvo staff, allowing to obtain skin spectra in vivo with a good signal-to-noise ratio even on the uncooled standard DNGS Fourier spectrometer Bruker.

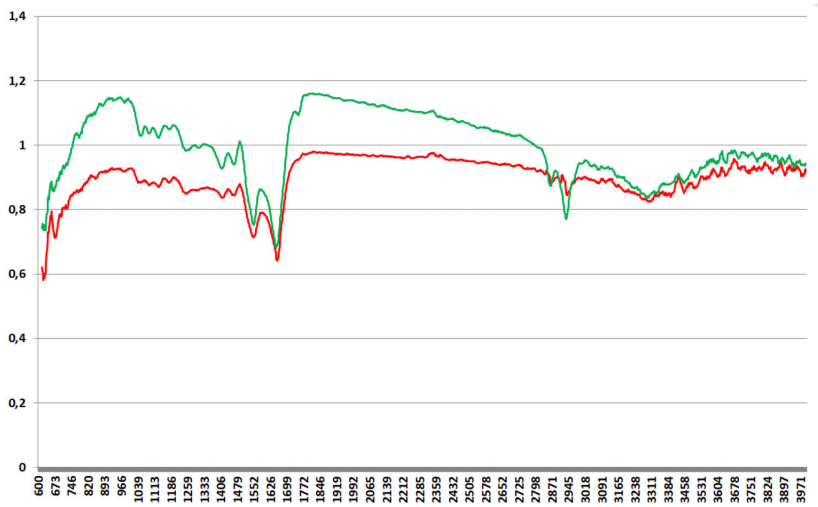

Fig. 5 IR spectroscopy of the inner surface of the left elbow joint

; spectrum of the left elbow joint area before treatment

spectrum of the left elbow joint area after RayForce treatment

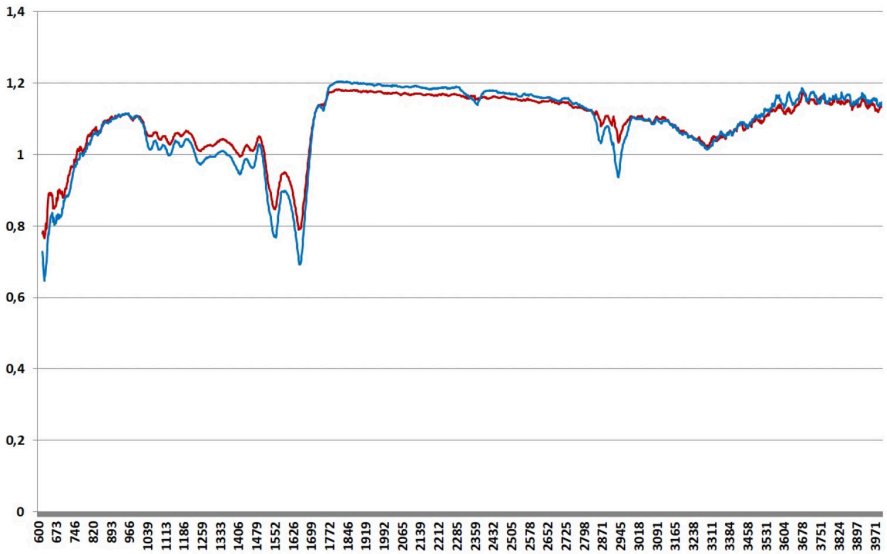

Fig. 6 IR spectroscopy of the inner surface of the right elbow

joint. spectrum of the right elbow

joint area before treatment spectrum of the right elbow joint area after RayForce

Results of RayForce treatment effectiveness based on IR spectroscopy data. This experiment confirmed the high therapeutic effectiveness of the RayForce device: For rice.5 IR spectroscopy shows the absence of pain in the left elbow joint after the treatment of RayForce device in the form of a complete restoration of the spectrum in the form and amplitude of light transmission, as well as correction of morphological changes in this area of exposure in the wavelength range of 970 – 1400nm. Based on the data in Fig.6. according to IR spectroscopy, there is reason to assert that the right elbow joint in the experiment was healthy and should be considered IR spectroscopy of the right elbow joint control.

Symptoms of coronavirus, the first signs of COVID-19.

- Elevated temperature.
- Dry cough.
- Dyspnea.
- The tightness in his chest.
- Runny nose.
- Weakness.
- Undue fatigability.

The lung involvement by coronavirus

The structure of human lungs is cellular. They consist of tiny bubbles saturated with air - the alveoli.

Each such alveola is surrounded by capillaries, through which, in fact, carbon dioxide is removed from the blood and oxygen is supplied.

Red blood cells (red blood cells) are responsible for their transport through tissues and organs.

Alveolar cells that participate in gas exchange are of two types: type I. Thin. Oxygen passes through them;

Type II. A surfactant is isolated - a substance that envelops the alveola and protects it from damage. The coronavirus attacks mainly type II cells.

Spiked proteins on its surface are bound by angiotensin converting enzyme 2 (APF2) on their surface.

So the virus "breaks" the protection and gets inside the cell, starting to replicate its RNA.

The host cell soon dies, and the coronavirus spreads to neighboring cells and thus gradually affects the lungs.

Naturally, our immune system does not sit still and actively produces macrophage cells.

The result of this struggle is the death of the alveoli and a decrease in the turnover of gas exchange.

This continues until the so-called alveolar collapse occurs and the acute respiratory distress syndrome begins.

In severe inflammation, fluid rich in inflammatory proteins enters the bloodstream and spreads to other organs and tissues.

This is how the systemic inflammatory response syndrome (SARS) develops, followed by septic shock and multiple organ failure.

The incubation period of COVID-19 is from 2 to 14 days, during which time there are no symptoms. Preventive physical therapy should be started as soon as a coronavirus infection is suspected.

1. light Therapy with the "BIOPTRON" device:
• impact on the face from 10 cm to 5 minutes;
• on the neck area with 10 cm 5 minutes;
• on the inter-scapular area with 5 cm 10 minutes;
• on the plantar surfaces of the feet from 5 cm to 5 minutes;
• on Palmar surfaces from 5 cm to 5 minutes;
• twice a day, daily, the course of treatment is 14 days.
2. Dry carbon dioxide baths "Reabox":
• CO2 concentration of 18-20%, 15 minutes, 1 time per day, treatment course of 14 days.

3. EHF therapy, the device " Yav»:
• paravertebral inter-scapular area with two points on both sides, the distance between the points is 10 cm;
• epigastric region;
• paravertebral at the level of the VII cervical vertebra;
• emitters: 4.9 mm (60.12 GHz), 5.6 mm (53.33 GHz) and 7.1 mm (42.19 GHz) for 3 minutes per field 1 time per day, daily, 14 days of treatment.
4. Therapeutic breathing exercises 5 minutes, 1 time a day, daily, 14 days of treatment.

In case of complications, the physiotherapist makes a plan of daily physiotherapy with hourly correction individually for each patient according to the state of the clinic.

Physical therapy is performed in combination with medication.

The proposed physiotherapy plan provides indications and contraindications at the supramolecular level, as well as for children from two years of age with a 50% reduction in the exposure time of each method, i.e. if an adult is 5 minutes, then children are 2.5-3 minutes.

When establishing the diagnosis of "pneumonitis" , the oxygen-helium mixture should be inhaled according to the developed method of academician A. G. Chuchalin from the AKGS-31 apparatus of the Minsk research Institute of radio materials.

Conclusion.

Given the characteristics of coronavirus (COVID-19) infection, its differences from other known viruses are

- suddenness of occurrence;
- high speed, scale and unhindered distribution;
- program selectivity of penetration into the intracellular space;
- consistency of the striking nature at the supramolecular level of chronically weakened organs and systems, taking into account their biological age.

The wave origin of coronavirus-19, that is, based on quantum mechanics (entanglement), should be assumed.

In this regard, it should be argued that a global solution to the problem of neutralizing the damaging insidious actions of the virus (COVID-19) is possible at the level of quantum physics and can only be done by a group of scientific physicists led by professor Lukin Mikhail Dmitrievich of the United States Harvard University.

The physiotherapeutic methods proposed above for the prevention, treatment, and rehabilitation of patients with coronavirus (COVID-19) infection are also consistent with quantum physics, since their mechanism

of action on the whole organism is identical to quantum touch, so they should be included in the program for combating coronavirus infection (COVID19).

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THE SCIENTIFIC BASIS OF THE MODERN ORGANIZATION OF AMBULATORY CARE FOR PATIENTS WITH CANCER

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In general, the organization of outpatient cancer care is very important for the early detection of cancer by clinical specialists. Preventive control is one of the main methods for early detection of cancer on an outpatient basis. Only 1-6% of cancers are detected in preventive measures in the Republic of Kazakhstan. The following research methods are used in the dissertation: analysis, direct observation, analysis of information-statistical and medical documents, statistical and social data.

Key words: clinic, cancer, organization, screening.

General description of research methods, statistical processing of research results. The research center included an oncology clinic and a city clinic in Shymkent.

The following research methods are used in the dissertation: analysis, direct observation, analysis of information-statistical and medical documents, statistical and social data [1,2,3,4,5]. After a complete answer, answers to anonymous questionnaires of respondents were collected and answers to open and closed questions were received to determine their reliability. Ambulatory patient records were analyzed randomly [11,12,13,14].

Processing was performed on a computer using MS Excel, and the results obtained during the study were subjected to statistical analysis using the SPSS version. (SPSS Inc 17, Chicago, Illinois, USA) [15, 16, 17]. To identify a large pattern in the description of quantitative indicators, we examined the type of population distribution on the Kolmogorov-Smirnov scale.

Regardless of the organization of special medical care, the mortality rate from oncological pathologists in Shymkent ranks second in the mortality structure [18,19,20]. Every year, 18,000 people die in CI, about 42.3% of them are able-bodied young patients. According to ten-year statistics, the prevalence of SI in Shymkent increased from 26.7 per 100 thousand of the population in 2016 to 45.3 per 100 thousand in 2019. In particular, the prevalence of this disease among young people in the Shymkent metropolis in 2016 amounted to 70.0% per hundred thousand people, and in 2019 - 48.9 per hundred thousand people [21,22,23,24]. The highest prevalence among people was found in 2016, when the prevalence of the disease was 31.0 per hundred thousand people, and in 2019 the disease reached a maximum of 49.2 per hundred thousand people. However, on the contrary, the lowest data were recorded in Saryagash in 2016 - 30.1, in 2019 they decreased to 30.2 per hundred thousand people [25.26.27.28].

RESEARCH RESULTS: Data show that over the past ten years the following types of malignant neoplasms have been identified with the following morbidity and mortality rates. The first ranking table determined the location of the breast, stomach, lungs, skin (15.1% of breast cancer in women and 8.9% of stomach cancer in men) (table 1).

The table shows the most common types of cancer that were first reported among the population of Shymkent in 1–2016–2019.

A place (I – X)	(I - X) Cancer Location	2009 .		2019 .	
		Absolute number	100 thousand people	Absolute number	100 thousand people
I.	General definitions cancer	2005	86,9	3123	109,2
1	Breast cancer	172	8,3	512	15,5
2	Stomach cancer	172	7,8	481	8,7
3	Lungs cancer	141	7,8	442	9,5
4	Skin cancer	140	6,6	412	8,5
5	Esophagus cancer	138	5,8	353	6,5
6	Uterine cancer	142	6,7	395	7,9
7	Liver cancer	86	5,9	321	6,4
8	Ovarii cancer	96	4,4	301	5,5
9	Kidneys cancer	86	4,3	93	4,1
10	Oral organs cancer	66	4,7	62	4,4

Breast cancer is in third place. It has recently been found to increase by 1.7%. Therefore, for the early detection of malignant breast pathologies in women, it is necessary to create a modern program and an integrated system of social and hygienic control.

And in fourth place - a malignant pathology of the esophagus. The initial level of this indicator is 41.2 ± 00, the minimum level is 40.1 ± 00. There is a decrease in the incidence rate, a hypothetical decrease of 0.3%.

Colorectal cancer is widespread among the population. Its value reached 31.2 ‰ 00 in 2016 and 31.9 ‰ 00 in 2016.

Therefore, it is necessary to create special conditions for the timely implementation of preventive measures to identify these diseases at an early stage.

Positive changes in the indicator development level can be explained by the introduction of innovative technologies and high-quality screening. The increase in the above nosologies indicates the need to pay attention to the increase in the number of dispensaries to improve work in this area.

According to Table 1, cancer is the second leading cause of death in the population. From 2009 to 2019, their level increased from 71.6% to 89.6%. Cardiovascular diseases took first place with a score of 103.1 ± 00, injuries and poisoning took third place with a score of 40.1 ± 00.

The new 10-year growth of the Shymkent metropolis in 2019 is 0.393 ± 00. According to the data, in the early years of the year, the incidence of cancer increased by 2.8 percent (Appendix 4).

During the monitoring of the situation with the provision of medical care for patients with cancer on an outpatient basis

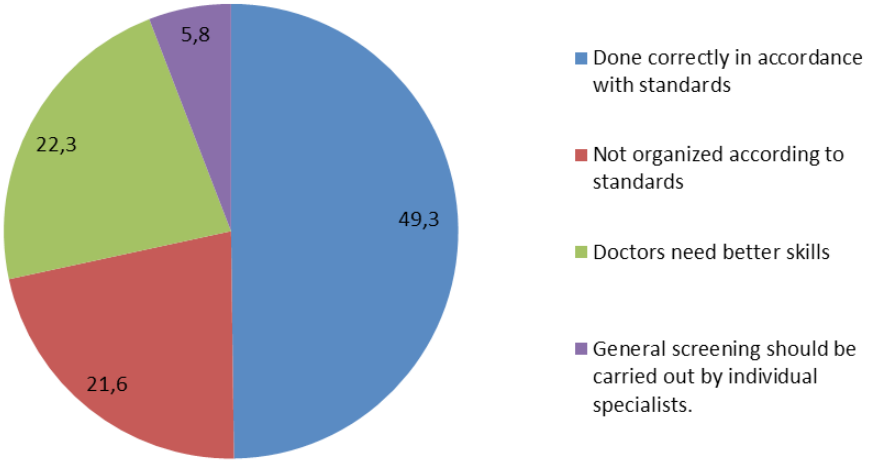

Figure 1 - Attitude of doctors providing outpatient care in the diagnosis of CI (in%)

The attitude of doctors to cancer screening has been studied. 49.3% of them believe that cancer screening is carried out in accordance with standards. 21.6% said they did not meet the standard. 22.3% of doctors believe that it is necessary to improve the knowledge of doctors in oncology in the field of primary health care. 5.8% indicated that cancer screening for general cancer should be done by individual doctors (Figure 1).

62.2% of the population were examined, 15.2% came for a preliminary examination, 12.5% were called for oncoscreening control, 8.8% were admitted to the hospital without treatment by ambulance (Fig. 1).

The following answers were received regarding cancer or illness. 73.9% of those who went to the clinic due to health problems, 26.5% were diagnosed with a call for preventive examinations. In other cases, 1.2% was detected (Figure 2).

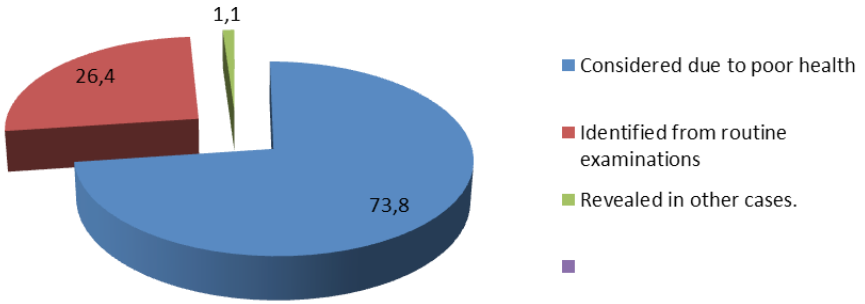

Figure 2 - Outpatient cancer detection among Shymkent residents (%)

Clinics asked: “How many cancer patients are in your area?” Most doctors did not give a clear answer. Only 42.8% (95% CI: 39.2-51.9) of precancerous diseases (intestinal polyps, cervical dysplasia, breast mastopathy, cirrhosis). fibrous cysts, mastopathy, chronic diseases of the lungs and stomach).

In this report, 34.1% (95% SI: 31.0-42.6) of outpatient doctors showed complete ignorance of cancer patients, 31.8% (95% SI: 28.6-37) of outpatient doctors wrote their opinion. 8) often showed background diseases. 14.3% reported the absence of cancer pathologies. And 8.2% thought about the answer (Figure 3).

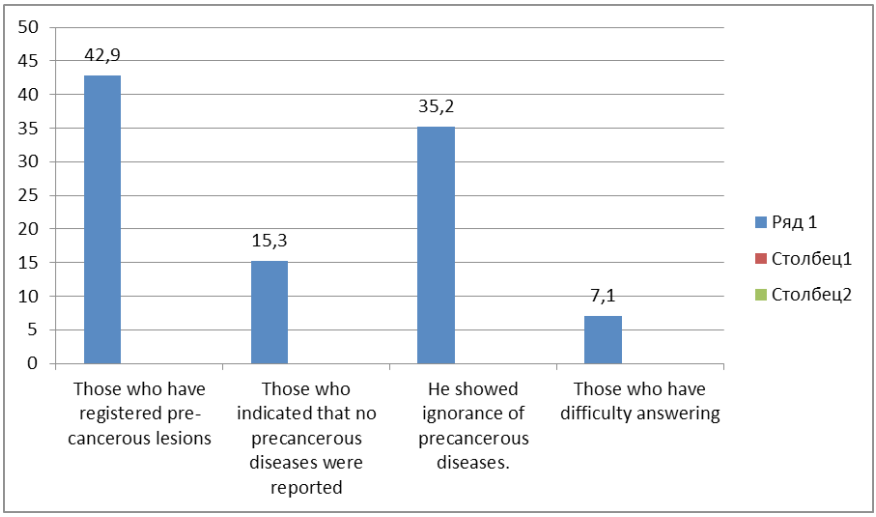

Figure 3 The level of outpatient registration of cancer patients in the dispensary

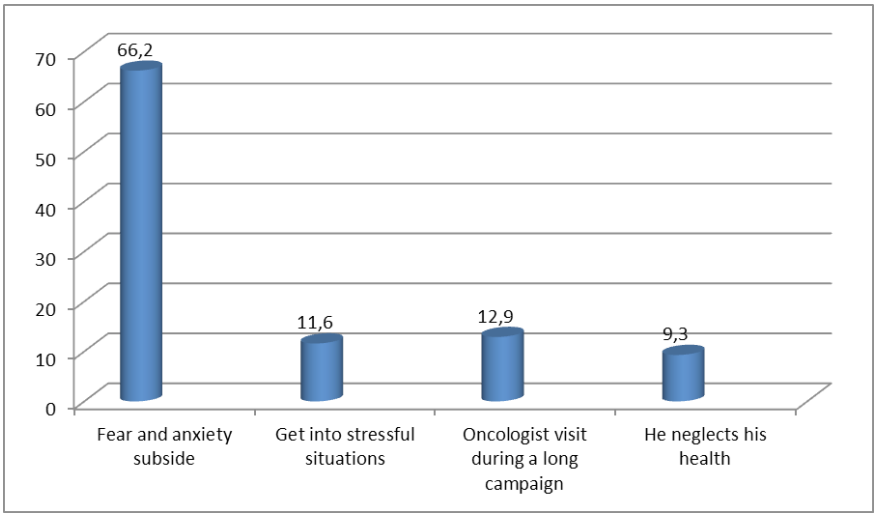

Figure 4 - The reasons why patients do not go to the clinic for timely examination

According to outpatient doctors, patients are afraid to visit oncologists, of which 64.0% are city doctors, 36.0% are district doctors. 66.2% (95% CI: 61.8-70.3) indicated that this fear did not allow patients to undergo further diagnostic tests. According to 55.9% of urban and 44.1% of rural doctors, 11.7% of patients with depression are suspected of having cancer (95% CI: 09.1-15.0). When interviewing patients, 38.2% of outpatients and city doctors, 61.8% of rural doctors, 12.9% (95% SI: 08.4-14.1) went to an oncologist, 9.3% showed negligence. , Health. Only 4.0% of patients (95% SI: 2.5-6.2) agreed to the examination immediately, which was found in previous studies [29,30,31,32,33,34]. "50.0% of doctors have identified insufficient hospitalization time because it takes a long time to fill out a medical certificate. 29.4% said a low level of qualifications in oncology is an obstacle. 25.6% of oncologists say that doctors regularly change jobs. 16.0% indicated that the measures taken for prevention were insufficient (Table 2).

Table 2 Obstacles to outpatient treatment of oncologists

Doctors were able to give several answers to the question in the questionnaire (N = 606)	Absolute number	100 thousand people
Medical records filling out documents	254	51,0%
Lack of qualifications in the field of oncology showed that they can not attend conferences, training courses	148	28,4%
Low salaries for doctors	127	26,6%
	81	17,0%
Inadequate preventative measures for cancer patients	606	122,0%

Doctors were able to show several answers to the question in the questionnaire, because it was in a semi-open form N = 606.

According to outpatient regional doctors, patients with cancer requested an increase in hospitalization by 13.8% for screening, treatment, registration and monitoring. He told the dispensary and the hospital about the length of the waiting day. 12.4% noted the need for technical improvement of the material and technical base of outpatient clinics, 7.8% noted the need for advanced training of outpatient doctors in the field of oncology, 44.5%.

According to the responses of outpatients, patients who sought help from an oncologist were not allowed to dismiss, they were afraid to be dismissed, the lines in the outpatient clinic were too long, and many ex-

pensive paid examinations were required [35,36].

These problems are a serious obstacle identified in the context of the main causes of late detection of cancer and factors that significantly affect the quality of treatment.

CONCLUSION

According to outpatient regional doctors, patients with cancer requested an increase in hospitalization by 13.8% to check, treat, register and monitor patients. He told the dispensary and the hospital about the length of the waiting day. 12.4% noted the need for technical improvement of the material and technical base of outpatient clinics, 7.8% noted the need for advanced training of outpatient doctors in the field of oncology, 44.5%.

62.2% of the population were examined, 15.2% came for a preliminary examination, 12.5% were called for oncoscreening control, 8.8% were admitted to the clinic by ambulance without treatment.

The following answers were received regarding cancer or illness. 73.9% of those who went to the clinic due to health problems, 26.5% were diagnosed with a call for preventive examinations. In other cases, 1.2% was detected.

Clinics asked: “How many cancer patients are in your area?” Most doctors did not give a clear answer. Only 42.8% (95% CI: 39.2-51.9) of precancerous diseases (intestinal polyps, cervical dysplasia, breast mastopathy, cirrhosis). fibrous cysts, mastopathy, chronic diseases of the lungs and stomach).

According to outpatient doctors, patients are afraid to diagnose oncologists, 64.0% of city doctors provided data, 36.0% of district doctors. 66.2% (95% CI: 61.8-70.3) indicated that this fear did not allow patients to undergo further diagnostic tests. According to 55.9% of urban and 44.1% of rural doctors, 11.7% of patients with depression are suspected of having cancer (95% CI: 09.1-15.0). 50.0% of doctors found that hospitalization was insufficient, since it takes a long time to fill out a medical certificate. 29.4% said a low level of qualifications in oncology is an obstacle. 25.6% of oncologists say that doctors regularly change jobs.

According to the answers of outpatients, patients who asked oncologists for help could not be fired, they were afraid to be fired, the lines in the clinics were too long, they had to go through a lot of expensive paid examinations.

These problems are a serious obstacle to the early detection of PI pathologies, the main causes of late detection of cancer, and factors that

significantly affect the quality of treatment.

Practical recommendations

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THE PERSPECTIVES OF FURTHER MODIFICATIONS OF ACETYLSALICYLIC ACID MOLECULE

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Acetylsalicylic acid (ASA) has been used for more than 150 years all over the world. This is the most common drug that is prescribed for the prevention and treatment of cardiovascular diseases, diabetes. More often, ASA is taken to relieve headaches, and also helps with colds and flu symptoms, providing an antipyretic and anti-inflammatory effect. A lot of research is currently underway on the derivatization of the ASA molecule. In our article we want to talk about modern modifications of the molecule and the changes in primary pharmacodynamics associated with structural changes.

Keywords: thrombosis, acetylsalicylic acid, antiplatelet drugs, diabetes mellitus, antitumor drugs.

ASA is by far the most popular and widely used drug in the world. It is used both for the treatment of joint and headache, migraine, thrombosis of various localization, as an antipyretic drug for colds and flu, for the prevention of cardiovascular complications in cerebrovascular diseases, myocardial infarction and diabetes mellitus.

Thrombosis plays an important role in the development of various cardiovascular complications, as well as in the pathogenesis of ischemic diseases such as: coronary heart disease, angina pectoris, acute coronary syndrome and myocardial infarction, ischemic cerebral stroke, gangrene of limbs and other disorders of the blood supply to organs and tissues, inflammatory and atherosclerotic vascular injuries with impaired endothelial integrity, slowing blood flow, imbalance of the coagulation and anticoagulation system, and violation of the rheological parameters of the blood occupy a significant place. With violations of the rheological parameters of the blood, the aggregation state of platelets and red blood cells plays a key role. With damage to the vascular endothelium of various etiologies, a thrombus forms and, as a result, a partial or complete occlusion of the vessel occurs [1].

Diabetes mellitus is one of the problems on a global scale, the importance of which is becoming more and more menacing every year, more attention is paid to this issue every year. The main reason for the growth of care is a change in the lifestyle of the population (lack of exercise, unbalanced diet, smoking and alcohol abuse), emotional overload. To date, more than 20 years of experience using ASA in patients with diabetes have been accumulated. Multicenter studies have been carried out that have proven the effectiveness of ASA in the primary and secondary prevention of cardiovascular complications in diabetes mellitus. Recent recommendations on the primary prevention of atherosclerotic complications of diabetes indicate low doses of acetylsalicylic acid as the primary treatment [2].

According to studies conducted over a quarter of a century, it was found that when using small (less than 300 mg) doses of ASA for 3 years, the risk of bowel cancer in both men and women is reduced by 25%. With a longer use (6.5 years) of small doses (75 mg), the risk of metastatic cancer is reduced by 36%. And the most useful effect (46%) was observed with adenocarcinoma of not only the intestines, but also the prostate and the lungs, and the risk of metastasis in cases of cancer of the larynx, liver, stomach and lungs was significantly reduced [3].

Modern prophylaxis and treatment of cardiovascular complications, diabetes mellitus and oncologic diseases, testifies to the undoubted rec-

ognition of the advantages of this drug, its therapeutic breadth and affordability. Modification of the ASA molecule with pronounced pharmacological activity is one of the relevant topics of modern science. Derivatization of the molecule allows you to report additional properties to the molecule, which reduces the risk of side effects, lower dosages, lower the number of drugs used, which is especially important for older people. Along with the modification of the molecule itself, the development of new dosage forms is very active. The liquid composition of the new pharmaceutical lipid-ASA complex has been developed to prevent damage to the gastrointestinal mucosa. Chewable aspirin tablets must be taken to treat acute myocardial infarction in accordance with the recommendations of the American Heart Association.

The synthesized halogenated azo-ASA analogs showed superior antibacterial activity against *Escherichia coli* compared to ampicillin. Derivatives of acyl-salicylic acid are potential anti-infective agents. Butyryl-salicylic acid exhibits significantly improved anti-infective activity against *Salmonella typhimurium*. Studies of structure-activity have shown that butyryl-salicylic acid ester binds to acylated key bacterial virulence factors and metabolic enzymes that are important for *Salmonella* infection of host cells and bacterial growth. In addition to gram-negative bacterial pathogens, butyrylsalicylic acid also showed better antibacterial activity compared to aspirin against *Clostridioides difficile*. It is noteworthy that the introduction of butyryl-salicylic acid, effectively weakened the pathogenesis of *Salmonella in vivo*. Complex $Co(ASA)_2Cl_2$ demonstrates an inhibitory action on *Bacillus subtilis* [4].

Metal complexes of non-steroidal anti-inflammatory drugs exhibit a synergistic effect and promising anticancer activity. Overexpression of COX-2 in various types of tumors, such as cancer of the prostate, colon or breast. Most NSAIDs indiscriminately inhibit both COX enzymes. The coordination of NSAIDs with metal centers is aimed at obtaining antiproliferative activity through a double action: inhibition of COX and, for example, the formation of ROS metal. The most promising is acetylsalicylic acid-butene-PtCl3. Replacing the ethylene ligand in Zeiss salt with an ASA-butene fragment led to a significant inhibition of COX (three times higher than one ASA) and antiproliferative activity.

Mixed ligand complexes of silver (I) with ASA and salicylic acid showed *in vitro* cytotoxic activity against adenocarcinoma of the ducts of the mammary gland, a smooth muscle malignant tumor.

The hexacarbonyl dicobalt ASA derivative is more active than cisplatin for sarcomatoid cancer cells. Modification of the aspirin framework

by organometallic fragments can alternatively increase or decrease ROS production in cancer cells. These compounds are more suitable for safe clinical use as the proportion between the desired anticancer activity and undesirable toxicity to healthy human cells.

Mononuclear and binuclear complexes of Co (II), Cu (II), Ni (II) and Zn (II) with ASA were tested *in vivo* for anti-inflammatory activity and showed a higher anti-inflammatory activity than the free ligand against paw edema in rats.

The Cu (II) complex with ASA studied the effect on rat thrombosis and the interaction between platelets. In addition, he inhibited platelet aggregation in rats by inhibited prostaglandin E2, was significantly stronger than that caused by ASA. The results of the study show that the selective inhibition of COX-2 in Cu (II) with ASA is seven times higher than in aspirin. Mn II complexes showed selective inhibition of COX-1 and COX-2 at the same concentration as ASA.

Structural modification of ASA and the addition of radicals such as alkyl, alkoxyl, amino, halogen and hydroxyl groups to the molecule to improve the effectiveness of drugs. All derivatives have improved pharmacokinetic properties, are relatively harmless, exhibit acute oral toxicity of class III, and may be useful for the development of potential selective COX-2 inhibitors effective against pain, fever and inflammation.

A neuromodulator, 2-((1H-benzo[d]imidazol-2-yl)methoxy)benzoic acid, an ASA derivative, has been developed as a potential anti-Alzheimer's disease agent. This bifunctional neuromodulator reduces neuroinflammation in microglia, increases life expectancy and attenuates Aβ-induced paralysis in Aβ-transgenic *C. elegans*, and reduces Aβ plaques, oligomers and neuroinflammation in the brain of mice with Alzheimer's disease.

Potassium and lithium salts of hydroxybenzoic acid amides can be used for the treatment and prophylaxis of acute and chronic brain circulation diseases, which is supported by an increase in animal survival, the lowest cognitive deficit in animals.

For the prevention and suppression of wound and other types of infections directly in the affected area, it is especially important in the conditions of primary treatment of wounds. Currently, polypropylene is one of the most used materials for non-absorbable suture surgical sutures, and acetylsalicylic acid is used as a substance with a therapeutic effect. The resulting material has a directed therapeutic effect in the area of the surgical intervention and has antiseptic and anti-inflammatory properties, since ASA itself appears in this zone and its action begins immediately after the operation.

In conclusion, despite long history of medical use of ASA this compound still is highly interesting for scientists around the world, who continue to study this molecule, modify dosage forms, use various combinations of ASA, and also modify the molecule itself by giving it additional properties, reduce the therapeutic dose, and also reduce the risks of side effects.

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CORRECTION OF ETHANOL HANGOVER IN RATS WITH N-ACETYLCYSTEINE

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Background. *This study was planned to provide an experimental basis for use of acetylcysteine as a precursor of glutathione in treatment of symptoms of ethanol hangover.* ***Methods.*** *The experimental study was performed using male Wistar rats, housed in standard conditions. Animals were allocated in 3 groups: Intact group – normal saline; Control group – ethanol + saline; Experimental group – ethanol + N-acetylcysteine. Animals were allowed to sleep. At the end of study animals were anesthetized and sacrificed, and the liver tissue was sampled for further assay. The concentration of reduced glutathione in liver homogenates was assessed. Statistical analysis was performed with methods of descriptive and analytical statistics. All data were presented as the mean and standard error of the mean.* ***Results.*** *After intraperitoneal administration of ethanol to adult rats, the animals received N-acetylcysteine woke up 3–40 minutes earlier.*

In rats that were injected with ethanol and saline, the content of glutathione in liver homogenates reached 96.5 ± 3.11 mg/g of tissue (versus 117.4 ± 2.95 mg/g of tissue in animals from the negative control group; p < 0.0001). In rats that were injected with N-acetylcysteine, the glutathione content of 111.4 ± 3.52 mg/g of tissue (p <0.05) did not differ from those recorded in animals that did not receive ethanol. ***Conclusions.*** *A single injection of N-acetylcysteine prevented the development of signs of oxidative stress caused by alcohol intoxication in rats. These findings allow us to support the use of N-acetylcysteine as a perspective medication for ethanol hangover treatment.*

Key words: ethanol, post-toxic state, hangover, acetylcysteine, rat, non-clinical study

Introduction

A hangover has profound negative socio-economic consequences. So, in 2010, the US Centers for Disease Control and Prevention estimated an annual loss of $ 179 billion associated with a reduction in labor productivity due to alcohol consumption. Despite the large socio-economic and medical costs of treating the hangover syndrome and its consequences, this problem is of relatively little interest among researchers, as a result, this extremely common syndrome still has many gaps in its pathogenesis. Alcohol is often used in doses that cause a hangover, and there is no universal symptom that would allow identifying a risk group, this symptom complex can occur in absolutely any person, regardless of their social, financial or legal status, mental and physical level. A deeper understanding of the pathological processes that occur in the body during a hangover is necessary in order to improve methods of its prevention or pharmacotherapy.

Pharmacotherapy is the only effective way to treat most diseases and hangover is not an exception. At the same time, it can be noted that the modern pharmaceutical market has a limited number of drugs for its prevention and treatment. The situation is complicated not only by the lack of coordinated opinions of the professional community regarding the pathogenesis of a hangover, but also by the difficulties encountered in initiating and conducting preclinical studies. One of the promising directions in the treatment of hangover is the development of agents that accelerate the metabolism of acetaldehyde. It is possible that a decrease in the metabolism of acetaldehyde due to glutathione deficiency arising (as a result of depletion during the metabolism of ethanol), therefore, the use of substances that can increase its content can restore the detoxification

capabilities of the liver, accelerate the metabolism of acetaldehyde and the disappearance of a hangover. The use of acetylcysteine for this purpose may become promising [2, 4]. This study was planned to provide an experimental basis for use of acetylcysteine as a precursor of glutathione in treatment of symptoms of ethanol hangover.

Methods

The experimental study was performed using male Wistar rats (300–450 g; 12–14 months of age), housed in standard conditions. Animals were allocated in 3 groups: Intact group – normal saline (i.p. + p.o.); Control group – ethanol (3 g/kg, i.p.) + saline (5 ml/kg, p.o.); Experimental group – ethanol (3 g/kg, i.p.) + N-acetylcysteine (1 g/kg, p.o.). After ethanol administration the righting reflex was monitored in all ethanol-treated animals [1, 3]. Animals were allowed to sleep. At the end of study animals were anesthetized and sacrificed, and the liver tissue was sampled for further assay. The concentration of reduced glutathione in liver homogenates was assessed in reaction with 5,5-dithiobis-(2-nitrobenzoic acid). All reactions were performed in triplicates.

Statistical analysis was performed with methods of descriptive and analytical statistics. The distribution of quantitative values was evaluated using the Shapiro-Wilk test. Intergroup differences were assessed with one-way analysis of variance with Newman-Keuls post hoc test. All data were presented as the mean and standard error of the mean.

Results and discussion

After intraperitoneal administration of ethanol to adult rats, the animals fell asleep for 2 minutes and their sleep lasted an average of 8 hours ± 30 minutes, and those received N-acetylcysteine woke up 3–40 minutes earlier.

In rats that were injected with ethanol and saline, the content of glutathione in liver homogenates reached 96.5 ± 3.11 mg/g of tissue (versus 117.4 ± 2.95 mg/g of tissue in animals from the negative control group; $p < 0.0001$). In rats that were injected with N-acetylcysteine, the glutathione content of 111.4 ± 3.52 mg/g of tissue ($p < 0.05$) did not differ from those recorded in animals that did not receive ethanol. Thus, a single injection of acetylcysteine prevented the development of signs of oxidative stress caused by alcohol intoxication in rats.

Conclusions

In rats survived an intoxication with a single intraperitoneal ethanol injection N-acetylcysteine decreased wake up latency and prevented an activation of oxidative stress leading to the hepatotoxicity. These findings allow us to support the use of N-acetylcysteine as a perspective medication for ethanol hangover treatment.

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KNOWLEDGE MAP AS A TOOL FOR WORK SAFETY AND HEALTH PROTECTION IN ENGINEERING CONSTRUCTION PROJECT

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Construction objects are anthropogenic objects generated by man to satisfy his needs, including the needs of housing. These objects are buildings, construction and small architecture objects that arise as a result of the implementation of construction projects. They must meet the requirements of safety and health protection throughout the entire life cycle, i.e. project preparation, construction works and its operation. Appropriate tools are needed to meet these requirements. The study proposes a map of knowledge as a tool for identifying and maintaining the required level of safety and health protection in engineering of construction projects, which in the future will be a compendium of knowledge for new investments of a similar scope.

Keywords: technical sciences, engineering of construction projects, knowledge map of safety and health protection.

Introduction

The role of knowledge in the field of occupational safety and health protection is very important in the modern world, and information is a factor by which one can take more efficient action. These two terms should be combined and on the basis of feedback: on the one hand, change information into knowledge, with continuous updating, and on the other - correct knowledge base on the basis of new information and new interpretation already possessed, thus creating a compendium of knowledge of safety and health protection. Next, indicate the area of occurrence (reality) and treat it as knowledge engineering.

The term "engineering" has long been used in science and technology to describe issues related to the analysis, research and design of various objects. Over the years, the understanding of the word "engineering" has evolved, its scope and content have changed. Currently, this term is most

often described as a procedure in which the analysis of a selected fragment of reality is conducted comprehensively using a system approach, and the proposed methods and solutions are formulated in a systemic approach. In engineering of construction projects, the specialist knowledge, skills and competences necessary in construction to develop and make decisions defining the manner, time, costs, quality and place of implementation of a construction project are described. After examining and formulating the investor's needs, technical, economic and environmental analyzes of the project's feasibility are carried out due to technical, economic and environmental impacts. This applies to the conditions of implementation of the project on the construction site and operation of the object. On this basis, the concept is prepared and the project implementation project is prepared, including the building construction project. At this stage of analysis and research, the building does not physically exist. It is a virtual object which, after obtaining a building permit, during the execution of works at the construction site, is transformed into a real object and put into operation [Kasprowicz T. i in., *Inżynieria przedsięwzięć budowlanych*, Polska Akademia Nauk, Komitet Inżynierii Lądowej i Wodnej, Sekcja Inżynierii Przedsięwzięć Budowlanych, Warszawa 2015, 270s.].

Knowledge in the field of construction projects regarding occupational safety and health protection is particularly useful in construction as a specific industry. The specificity results mainly from the conditions in which the implementation of projects in which construction objects are created (buildings, structures, small architecture objects). Specific features of the construction process include:

- the individual character of each undertaking,
- significant dispersion of ongoing construction facilities in the field,
- real estate construction works,
- dependence on atmospheric influences,
- getting the effects of building objects late,
- significant dimensions and large mass of building objects,
- long service life of construction works,
- the random nature of the duration of construction processes.

After the construction works have been carried out, the phenomenon of "disappearance of knowledge" among the participants of the undertaking. It is recommended to gather this knowledge.

Construction companies, by implementing construction projects, transform projects into objects - elements of infrastructure that start with the receipt of an order or signing a contract with the client. The implementation of construction works is based on a contract agreed

and approved between the parties. The place of works is located where a given element of infrastructure is created. Such activities mean that construction companies carry out works on various construction sites where works are planned in the contract. Implementing the project, the construction company also coordinates the activities of suppliers and subcontractors who provide the necessary resources such as: workforce (own or subcontractors), machinery and equipment (own or subcontractors), materials, equipment, vehicles and office premises. Among these activities, knowledge of occupational safety and health protection is necessary.

THE CONCEPT OF THE SAFETY AND HEALTH CARE KNOWLEDGE MAP (S&H KNOWLEDGE MAP)

In the literature on the subject, various varieties of the Knowledge Map are found. They are used in various fields and in the design of technical equipment [12] and increasingly in the implementation of construction projects.

The classical concept of the knowledge map is modeled on three-dimensional cartographic maps (Fig. 1).

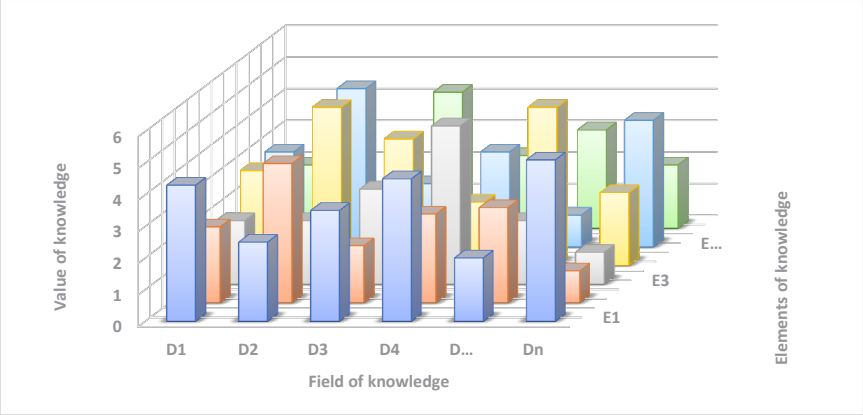

Fig.1. The Knowledge Map in a universal perspective

The basis of the knowledge map is determined on the "x" axis of the domain (**D**) and on the "y" axis by knowledge elements (**E**), and on the "z" axis is given the value of knowledge expressed in points, percentages, decimal numbers or other units. The presented situation illustrates the state of deficiencies of the required knowledge in specific elements, which

means that knowledge should be supplemented within a specified time. The reason for the lack of knowledge may be faulty training or education and the aging of knowledge in the long term due to failure to keep up with changing legal regulations and technical progress.

The S&H Knowledge Map is a record of domain knowledge. Nineteen fields of knowledge were designated and marked with the symbol D_i. Elements of knowledge were assigned to the fields of knowledge and marked with symbols E_j.

- It is recommended that prior to the development of the S&H Knowledge Map carry out a *preliminary review* of the project. It should include:
- identification of requirements arising from legal and other provisions in relation to the organization's activities, and in particular in relation to jobs and products and services subject to supervision,
- assessment of the company's performance in comparison with relevant regulations, standards, guidelines and internal criteria,
- analysis of cases of non-compliance with the requirements of legal provisions (for example, ascertained by the supervisory authorities over working conditions, National Labor Inspectorate bodies),
- identification of hazards at workplaces and other hazards associated with the company's activities, products or services, which it can supervise and which the company can influence,
- checking all the applicable procedures in the field of the company's business,
- analysis of data on accidents at work, accidents and occupational diseases in the enterprise,
- work rules and procedures as part of other activities carried out in the enterprise that may affect the results of the enterprise's activities, including health and safety.

A typical *S&H Knowledge Map* of a construction project should cover the following areas:

D1 - Involvement of participants in a construction project,

D2 - Safety and health protection policy,

D3 - General and specific objectives for health and safety (BIOZ objectives),

D4 - Structure, responsibility and powers in the area of health and safety (BIOZ),

D5 - Provision of funds

D6 - Training, awareness, competences of threats to participants of a construction project,

D7 - Communication,

D8 - S&H documentation of the stages of the project: preparation, execution of the object (construction), operation of the building,

D9 - Professional risk of project participants,

D10 - Organizing works and activities related to significant aspects during project implementation,

D11 - Accidents at work, major accidents, catastrophes in the life cycle of a building,

D12 - Involvement of participants: investor, designer, construction manager, building manager in the study of accidents at work, occupational diseases and potentially accidental incidents,

D13 - Resources (purchases of goods and services) necessary at individual stages of the project,

D14 - Subcontracting,

D15 - Monitoring,

D16 - Auditing,

D17 - Reliability, corrective and preventive actions,

D18 - S&H inspections,

D19 - S&H improvement.

Fields of knowledge are described with the help of elements that constitute the main components - whole particles containing the most important information about a given field, in accordance with the basic definition of an organization, i.e. organization is a whole composed of parts for success, which parts contribute and parts contribute to success whole.

Summary

On the one hand, the development of civilization allows people to meet the needs of people better, faster and cheaper, on the other hand, it generates new, previously unknown threats to health and life. These threats can cause a loss of security.

Construction facilities are anthropological facilities with a long life span and they require particular knowledge in the field of safety and health protection. In any case, they should be designed, built and operated in a way that is safe for human health and life.

The proposed Knowledge Map is a compendium of knowledge that uses information from the guidelines of the International Labor Organization, European Union directives and national (Polish) legal regulations regarding safety and health protection in construction, as well as the experience of participants involved in the implementation of construction projects that can be used in the implementation of future construction investments.

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ENGINEERING SAFETY OF ANTHROPOGENIC OBJECT

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Safety engineering of anthropogenic object requires:

Knowledge of interdisciplinary technical and specialist knowledge in the field of basic methods and tools used in solving engineering tasks related to general security of technical objects - in the process of design, construction and operation;

Knowledge of modern technology and research instruments capable of detecting and forecasting the development of threats, IT processing, protection and risk prevention and liquidation of their consequences;

Diagnostic skills with regard to threats to the safety of technical objects with the use of modern technology and research instruments;

Knowledge of safety engineering principles adopted in the European Union and national legislations.

Keywords: security, anthropogenic object, engineering

Introduction

An important problem in the development of modern technology is safety engineering of anthropogenic objects to implement a variety of human needs - covering a range of theoretical and practical security issues concerning man-made objects in the following areas: technical, economic, legal, organizational and logistical. The processes of designing, making, distribution and operation of facilities anthropogenic object all involve safety issues. Due to the wide recognition of the problem formulated in this paper, the author has made an attempt to clarify a number of important concepts involving the issue of safety engineering of anthropogenic objects, such as the environment, human needs, the consumer, the object of human activities, security, threat, security engineering.

Basic concepts of engineering safety of anthropogenic object

The human environment

In accordance with Art. 3 Section 39 of the Environmental Protection Law of 27 April 2001(Dz. U. 2013, pos. 1232 as amended), the concept of the environment is generally understood as all natural elements, including those transformed by human activities, and particular areas of land, minerals, water, air, landscape, climate, and other components of biological diversity, as well as the interactions between these elements.

The environment is a natural place of all social life. Man lives in and manages specific environmental conditions, uses its resources, transforms elements of the environment and introduces new components - the products of their own development. Taking into account the level of transformation of the environment (anthropopression) by the man, S. Leszczycki [12] mentions:

- the natural environment (the nature), a set of natural elements in a given area. It is assumed that an area can be called the natural environment when the degree of conversion of its components by the man does not exceed a few percent. Currently, on the Earth such areas are circumpolar areas, desert, alpine and the lowermost parts of ocean beds;
- geographical environment (the transformed) is defined as a set of natural elements transformed in more than 50% and of artificial elements, i.e. settlements, industrial, agricultural and transport infrastructure;
- anthropogenic environment (the artificial) is geographical environment saturated with products of human development in about 90%, for example urban and industrial areas.

All components of the environment are on the surface of the Earth, inside the Earth's crust and in the troposphere, which is a three-dimensional geographical space. The boundaries of the geographic space are now lower limit of the crust and the upper limit of the troposphere. All the natural elements of the environment are closely interrelated and interdependent. Together they form a complex, pervasive ecosystem. Changing one of the elements of this system will affect its other constituents. All ecosystems are based on the same principles of flow and conversion of energy. Therefore, they have the ability to self-regulate, which allows for maintaining the state of natural balance. On the other hand, disorders relating to individual components of the ecosystem can disrupt the whole of the ecosystem. The larger these disorders are the longer it takes the entire ecosystem to return to the state of equilibrium. If problems in the ecosystem are too big, the ability of the environment to self-regulate is disrupted, and a return to the natural balance is not possible. The environment is then irreversibly degraded.

This article deals with anthropogenic environment (the artificial), or geographical environment saturated with products of human development, which includes anthropogenic objects created to enable the satisfaction of various human needs. An important objective of safety engineering is the creation of such objects that allows the satisfaction of specific human needs that do not endanger the health or safety of human life due to improper design and construction in functional - operational and constructional – material areas. Implementation of this objective is the main problem of anthropogenic objects safety engineering [2, 3, 4, 5, 6, 7].

The concept of human needs

A need is a property of the human body that leads to a state in which a person cannot function normally (to use their abilities in action) and develop irrespectively of certain conditions. Unfulfilled need leads to a state of tension that requires discharge. In other words, the need is a desire, willingness, and sensation. In human life, needs play a significant role. They have a decisive impact on the lives and actions of people. They are factors driving human activities aimed at satisfying them.

The main sources of needs are:

- the human being, in particular their physical and spiritual needs,
- the natural environment, climatic conditions,
- socio-economic life

Needs can be divided into two groups:

- **Natural needs** (called physiological, elementary, basic) associated with the biological conditions of human existence and physiological activities of the body. These include the need to diet, dress, housing and recreation. They are related to the maintenance of human life and physical fitness. The satisfaction of physiological needs is a prerequisite for human and biological life;
- **The needs of a higher order** (also known as mental, or secondary) arising out of the human psyche and its relation to the natural and the social environment, such as: the needs of security, employment, upbringing and education, culture and tourism.

The above-mentioned groups include the following needs:

- Physical and mental
- material and cultural,
- objective and subjective,
- single and repetitive.
- complementary and substitutable,

- individual and collective,
- potential and efficient,
- present and future,

Needs are an internal factor related to the functioning of the human body, and their role is to stimulate organism to act in order to meet the resulting incentive tension. Thus, a need does not motivate constantly, it is activated only when it is unfulfilled.

All sorts of tangible and intangible goods allow for realization of human needs. In economics, goods are means that can be used, directly or indirectly, to meet human needs. The main interest here is tangible material objects - designed to meet a specific need or needs. Material goods, capable of fulfilling human needs can be divided into [21]:

- **natural goods -** made by nature and
- **anthropogenic goods -** man-made.

Our interest is in anthropogenic goods - also called economic goods - that is, all the materials produced by the man in the production process in order to meet human needs.

Concept of security

Security is an interdisciplinary concept and the exploration of its aspects is involved in many different fields of science. These include history, psychology, sociology, law, political science, military science and much more. As rightly pointed out by K. Gołaś [8] „…from the wealth of sciences dealing with this problem it can be concluded that the concept of "security" is very extensive in terms of meaning and definitions - because every branch of science deals with various aspects of security". R. Klamut [10] states that „….the concept of security is an ambiguous concept, and depending on the area or areas of knowledge analysis is variously understood. In addition, it can also be combined with other concepts, and thus allows for more semantic contexts. As a result, there is a great variety and often a lack of clarity about the meaning of security. In the situation when the same terms are used in many fields of knowledge or when concepts are interdisciplinary, there is a danger of inadequate understanding of the importance of specific research for a specialty or field of knowledge". L. Korzeniowski [12] indicates the possibility of understanding 'security' in several ways: as a need, value and sensation.

The present work aims to characterise security in relation to technical objects created for the realization of a variety of human needs.

The simplest meaning of this term can be drawn from the etymology of "security". In Latin, the term "security" – "securitas" consists of

two parts: sine (without) and cura (worry, fear, fear) and indicates that it means "the state of security, peace, confidence, lack of worry and fear, confidence and protection against the dangers" [1,10,11,19,20,22,23]. Also, the American psychologist A. Maslow [13] developing a hierarchy of human needs, categorized the need for security (certainty, stability, support, care, freedom from fear, anxiety and chaos) in the second place, just after physiological needs - necessary to sustain existence - recognizing that satisfaction of the need for security is essential to healthy functioning.

Security issues have absorbed humanity since its inception. P. Barciak, discussing the essence of safety [1], states that "the man has always stood in the face of various threats, and the struggle for existence, survival and care to ensure the safety of himself and the closest relatives has become his natural need. With the development of civilization and the changing world the need for security is not decreasing. On the contrary, it is growing and has become even more complicated. For the humankind the guarantee of survival was not sufficient. The man wants something more: stability, predictability, development, prosperity... ". One must therefore agree with the statement by J. Stańczyk [24] that „Security is the principal need of individuals and social groups, and also their most important objective. Security is an existential need – it concerns the existence of an individual”**.**

The need for safety is manifested in social and interpersonal forms, and it creates the basis for the organization and functioning of everyday life at all levels of the society – from the individual to the national one. Security in terms of the needs of the public includes protection of existence, survival, safety, stability, identity, independence, protection and quality of life [22, 23]. That versatility makes it not only the supreme need of humans and social groups, but also the basis for the functioning of national and international systems [9, 24]. Its lack causes anxiety and insecurity, and the task of the state is to eliminate, or at least minimize the threat, anxiety and uncertainty caused by fear, thereby creating optimal conditions for citizens to develop. Given the above, it can be concluded that to provide security - is to be able to meet existential needs of an individual, as well as to provide opportunities for an individual to secure himself his existence, survival and development by himself. Security is also a state of certainty as to the above possibilities. Security is a state of certainty and guarantees its maintenance, giving a sense of stability and allowing for further development of the individual. This need for order and harmony is one of the basic

existential needs of man and is characterized by a lack of fear of loss of values, such as life, health, affection, respect, work, or goods, both tangible and immaterial [15, 17, 18]. In this context, security is treated as a factor that elicits an action if its absence is felt. Thus, a security risk constitutes the motivation to take action to restore security. This threat does not have to actually exist. It is just enough that a man predicts a possible threat to his security.

To summarize the theoretical considerations about the concept of security and its nature, it is reasonable to quote the definition of the concept adopted by S. Koziej [13], according to which most commonly „…safety is defined as both the state (achieved sense of security of a human being) and process (providing a sense of security for them)”**.** The latter is a more practical approach as one reflecting the natural phenomenon of the dynamic nature of security.

In this sense, security of an individual is the area of his activity which consists in ensuring the survival (existence) and the freedom to pursue his interests in a dangerous environment, particularly by exploiting opportunities (favourable circumstances), to meet challenges, reducing risk and preventing (prevention and opposition to) any kind of threat to his life and interests. From the work [13] it follows that risk assessment is undoubtedly an underlying factor when it comes to solving the most important security problems.

Main threats, and hence the state of security, are often dealt with in a dualistic manner of dividing the safety of an anthropogenic object internal safety and external safety - which is due to anthropogenic functioning of each object in a given environment, which constitutes "surroundings" of an object [2,3,4,5,6,7]. The concept of "safety of anthropogenic objects” includes two aspects: internal and external, depending on where they are located and where threats originate:

- **Internal security** means lack of danger for the individual using a particular anthropogenic object to meet the needs generated by the anthropogenic object;
- **External security** lack of danger for other objects in the environment of the individual using or the anthropogenic object to meet the needs generated by the anthropogenic object.

By combining internal and external aspects of safety of anthropogenic objects, one can afford a comprehensive grasp of the safety of a facility [3, 4]. The concept of safety of an anthropogenic facility involves such areas as economic, social, military, public, environmental, information, logistics, etc.

The concept of danger

As is clear from the above observations, defining security one should also be aware of its relationship with the concept of danger. Semantically, "safe" means something protected from danger. This suggests that the state of jeopardy bears primacy over safety. The phenomenon of the threat has two aspects: the subjective - existing only in the sphere of awareness of an individual, or a feeling or perception of their situation as hazardous; and the objective - that is actually occurring events and phenomena that cause anxiety and threaten an individual [22, 23].

J. Stańczyk [24] sees the essence of safety in the analysis of objective and subjective aspects of the threat. A similar approach, in this respect, represents T. Kołodziński [11], who emphasizes that the threat perception is subjective in nature and in fact is a reflection of the feelings and assessments formulated by an individual in certain states. However, they have a significant impact on the actions taken in view of certain risks; actions whose task is the elimination or reduction of its harmfulness, when it occurs. T Kołodziński [11], referring to the relationship between the seriousness of a real threat and its perception by an individual refers to Daniel Frei, who distinguished four possible security assessments:

• the condition of insecurity arises in a situation correctly perceived a real threat;

• the condition of obsession, which begins with a slight exaggeration of risk;

• the state of false security based on minimizing the perception of a serious threat;

• the feeling of security occurs when a threat is slight and correctly perceived.

S. Koziej [13] assumes that the threat has direct or indirect destructive impact on an entity. According to [12, 13], he distinguishes the following risks:

- potential and real;
- subjective and objective;
- internal and external;
- military and non-military, *(political, economical, social, informational, ecological, etc.).*
- crisis and war and
- intentional and accidental.

Considering the above, after T. Kołodziński [9], we assume that the “threat involves the sphere of awareness of an entity (an individual, social group, nation) and is a state of consciousness or the perception of phe-

nomenon assessed as unfavourable or dangerous. Perception of threats by the entity, as well as his sense of security, is reflected in the awareness of a real or potential threat. What follows is that a perception may be incompatible with facts. Thus, assessing the security situation one should take into account the reality which includes threats to individuals or the society, and the state of their knowledge and awareness which involves perception of these threats and a sense of security".

Safety is subjective and is a basic need for humans and social groups, and the state. Therefore, every human, social group and EU member states try to interact with their external environment and the internal sphere to remove or at least minimize a variety of potential and real threats generated by human environment. Principally, risks associated with different products (goods) introduced on the EU market will be referred to by the name of the 'anthropogenic objects'. Such objects are deliberately created by the man in order to fulfil a variety of needs, both individual and collective.

The concept of an anthropogenic object

The subject of interest here are objects representing anthropogenic material goods, i.e. things (material objects, products, goods, objects) in technical and legal terms (art. 45 of the Civil Code). Material goods are items that represent the goal of human aspirations and are referred to as consumption material goods - because they fulfil the diverse needs of people. Additionally, material goods can be used in order to produce other material goods that may be, e.g. production goods. Material goods produced intentionally by humans are referred to as: products, goods, or objects. They can be mobile and immobile.

The subject of our interest is anthropogenic objects, i.e. material objects which are of a technical nature created by man. They are characterized by certain physical characteristics and functional and utilitarian features tailored to meet specific human needs, including the need for security, which means that the objects satisfying certain needs must also be safe for humans.

Thus, it is assumed here that anthropogenic objects are technical object deliberately created by men (such as machinery, equipment, building structures, etc.) or objects fulfilling various human needs, including the need for human safety. Creation of a technical object involves the following primary stages:

• the verbalization of the need to create an object (resulting from the necessity to meet specific human needs);

• the design of the object (requiring determination as to material and technical processes, which should be in accordance with applicable rules, regulations and principles of technical knowledge);

• production, intended for the manufacture of certain products designed to meet social needs. There can be many kinds (types, forms and varieties) of production: due to goals, complexity, size, scale, organization of work, the continuity of production, type of products and their varieties;

• distribution - includes all activities related to overcoming spatial, temporal, and quantitative differences between the place of production and the place of use (consumption);

• exploitation a technical object taken in relation to the manufactured object. The process of operation includes four basic types of activities: usage, handling, powering, and management;

• elimination of the object.

The process of using acquired goods (technical objects) in order to meet the needs, is called consumption. The entities for whom anthropogenic objects are made are referred to, in literature and regulations, as consumers, users, tenants, etc.

It is usually understood that the term "consumer" is based on the following criteria:

• subjective - defining it as a natural person and

• functional - defining consumption as unrelated to business or professional activity.

The above-mentioned definition of the "consumer" refers to the concept adopted in economics [25], where the consumer is defined as a user of purchased goods or services (consuming goods acquired in economic terms). The concept of consumer is defined in Directive 2011/83 / EU of 25October, 2011 concerning consumer rights, Art. 22 (1) of the Civil Code and the law of 30 May, 2014 on consumer rights.

The concept of a consumer is directly related to the idea of consumer rights [28]. It is believed that consumers are weaker than market participants (i.e. they have less knowledge and are dependent on manufacturers to produce products, goods, etc.) who may influence consumers to make decisions contrary to their interests (e.g. to provide products of inferior quality, the use of misleading advertising, etc.). Therefore, legislation in many countries uses various methods of legal protection of these rights. In Poland, consumers' rights are protected by the provisions of Article. 76 of the Constitution, which states that: "Public authorities will protect consumers, users and lessees against activities threatening their health, privacy and safety and against unfair market practices" as well as the provisions of the Act of 30 May, 2014 on consumer rights.

The concept of safety engineering

By R. Zieba [26] and J. Ziarko [27] quote the most general definition of safety contained in the "Dictionary of the social sciences" by UNESCO. The definition included there, compiled by Daniel Lerner, provides that „in the most literal sense, security is virtually identical with certainty and indicates lack of physical danger or protection against it".

The concept of safety engineering of anthropogenic objects (to implement a variety of human needs) refers to practices (in technical, economic, legal and organizational terms) that occur in the process of design, construction and operation of anthropogenic facilities, which are aimed at ensuring the safety of these facilities through elimination or restriction of danger to an acceptable level or creating conditions to ensure effective protection [2, 3, 5, 6, 7].

Safety engineering deals with ensuring compliance with safety requirements, and performing risk analyses, i.e. identifying and preventing risk factors. These actions are performed appropriately to the type of object and the foreseeable risks that may occur during the expected existence of objects. Thus, its area of activity involves carrying out rescue and logistic operations, and controlling compliance with broadly defined security policies, conducting investigations into circumstances of breakdowns and accidents, and keeping records related to security.

Safety engineering of anthropogenic objects, such as machinery, equipment, industrial systems, and buildings concerns the determination and continuous improvement of practices and the knowledge of requirements and safety rules in the area of design, construction and operation of these facilities - appropriately to their purpose. It mainly involves the following skills:

- Identification of problems and tasks in the area of monitoring, decision-making, operation and diagnostics of the above mentioned facilities, and the management and engineering of operation of these facilities;
- Developing safety management strategies and actions to promote the reliability of facilities;
- Identification of the needs of the economic environment and implementation of innovative actions;
- Identification of threats to personal safety, communication technology and engineering research methodology.

General principles of safety engineering of anthropogenic object

The essence of the object of anthropogenic safety engineering is proceeding leading to the creation of a secure facility. To achieve this goal it is

necessary to take action consisting in transmitting to the subject of such features, which will allow the [2, 3, 5, 6]:

• eliminate or reduce risks to human size (up to the level of fishing) anticipated to occur during the lifetime of the object - the object generated from the (ob, h) under the influence of the functional-utility solutions and construction-material under the influence of an object and its environment interactions(ob, en) and

• eliminate or reduce the size of the risks to the environment of the object (to an acceptable level) anticipated to occur during the lifetime of the object - the generated in the object as a result of interactions with the environment (en, ob) under the influence of the functional-utility and construction-material solutions adopted in the object.

A schematic diagram of the conditions of anthropogenic safety engineering facility in its creation and operation illustrated in Fig. 1.

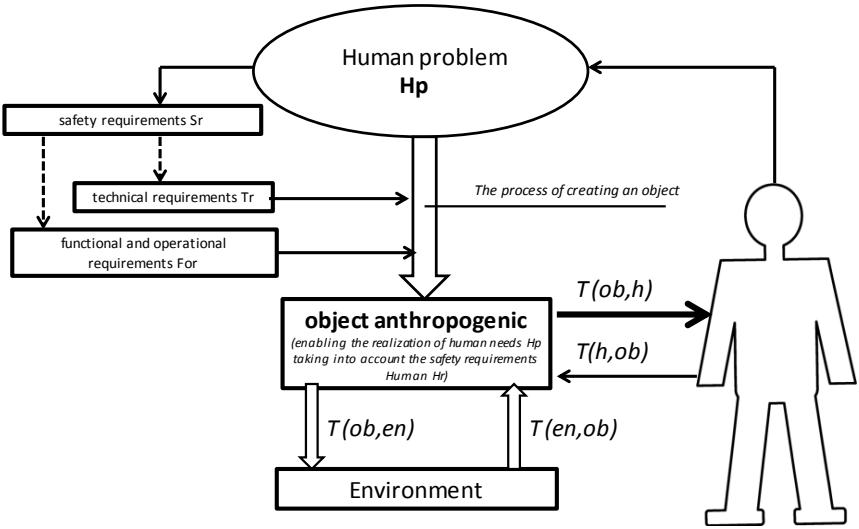

Fig. 1 A schematic diagram of the conditions of anthropogenic safety engineering object in its creation and operation.

T(h,ob) – human threats originating in the anthropogenic object

T(ob,h) – object anthropogenic threats of human origin,

T(en, ob) – environmental risks derived from the anthropogenic object

T(ob,en) – threats to an anthropogenic object originating in the environment,

The activities being the core of safety engineering will be called anthropogenic activities immunizing an object to certain threats [2, 3, 4, 5, 6].

Timewise, these actions can be divided into two stages of immunization of a building:

- primary immunization - involving the immunization of the object at the time of its creation (at the stage of programming, design and implementation);
- secondary immunization - involving the immunization of an existing object.

Forms of immunising anthropogenic objects

Safety engineering of anthropogenic objects is related to materials engineering, environmental engineering, computer science, and mechanics in design processes, construction and operation of anthropogenic facilities. Immunization of anthropogenic objects, depending on the type of object can be carried out (as part of primary and secondary immunization) by the following activities [2, 3, 4, 5, 6]:

- spatial solutions;
- functional solutions;
- construction and material solutions;
- selection of installation and technical equipment;
- organizational solutions.

Most commonly, primary immunization costs of a specified object are smaller than the cost of immunization related with secondary immunization on an existing one.

Problems of modern technologies in support of the wider security systems

As pointed out by Z. Mierczyk [16], the issue of safety engineering research with relation to anthropogenic objects filling our environment is closely related to modern technologies detecting and forecasting the development of threats, IT processing, protection and risk prevention and liquidation of their consequences. Development of new technologies, supporting security systems (in the broad meaning of the term), is interdisciplinary and includes numerous fields of science, such as chemistry, materials science, mechanics, electronics, information technology, automation and robotics, telecommunications, environmental engineering.

The need for action in this field stems from the need of equipping state services ensuring security to citizens with specialized technical equipment and information systems to support monitoring, identifying and countering threats to the security of citizens, including decision-making processes, information, emergency and crisis management, and effective emergency management and crisis response activities. These technologies include the following areas [16]**:**

• Technical security is primarily concerned with the design, construction, operation and disposal of buildings and industrial and municipal infrastructure. This applies to virtually all fields of technology, such as nuclear energy, conventional energy, transport, industry, construction, etc. The main areas of interest of safety engineering in terms of technical safety include issues related to sensors, measuring devices and systems for monitoring the safety of anthropogenic objects and natural environment, and management automation in the event of risks (industrial accidents, natural disasters, terrorism).

• Civil Security focuses on matters of protection against the effects of various threats, determining the standard of living and health of the population.

Contemporary needs in the area of security require seamless cooperation between all state institutions, administration and government, and adaptation of their working methods to new threats, including the need to have at their disposal a modern, integrated crisis management systems [16].

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