SCIENTIFIC RESEARCH OF THE SCO COUNTRIES: SYNERGY AND INTEGRATION

上合组织国家的科学研究：协同和一体化

Materials of the International Conference

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国际会议

参与者的英文报告

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

Part 3: Participants' reports in English

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Materials of the International Conference
"Scientific research of the SCO countries: synergy and integration" - Reports in English. Part 3.

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

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

Authors are responsible for the accuracy of cited publications, facts, figures, quotations, statistics, proper names and other information.

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Foreword

We thank all participants of our conference "Scientific research of the SCO countries: synergy and integration" for the interest shown, for your speeches and reports. Such a wide range of participants, representing all the countries that are members of the Shanghai Cooperation Organization, speaks about the necessity and importance of this event. The reports of the participants cover a wide range of topical scientific problems and our joint interaction will contribute to the further development of both theoretical and applied modern scientific research by scientists from different countries. The result of the conference was the participation of 56 authors from 7 countries (China, Russia, Uzbekistan, Kazakhstan, Azerbaijan, Tajikistan, Kyrgyzstan).

This conference was a result of the serious interest of the world academic community, the state authorities of China and the Chinese Communist Party to preserve and strengthen international cooperation in the field of science. We also thank our Russian partner Infinity Publishing House for assistance in organizing the conference, preparing and publishing the conference proceedings in Chinese Part and English Part.

I hope that the collection of this conference will be useful to a wide range of readers. It will help to consider issues, that would interest the public, under a new point of view. It will also allow to find contacts among scientists of common interests.

Fan Fukuan,
Chairman of the organizing committee of the conference
"Scientific research of the SCO countries: synergy and integration"
Full Professor, Doctor of Economic Sciences,
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前言

我们感谢所有参加本次会议的"上海合作组织国家的科学研究：协同作用和整合"，感谢您的演讲和报告。代表所有上海合作组织成员国的广泛参与者都谈到此次活动的必要性和重要性。参与者的报告涵盖了广泛的主题性科学问题，我们的联合互动将有助于不同国家的科学家进一步发展理论和应用的现代科学研究。会议结果是来自7个国家（中国，俄罗斯，乌兹别克斯坦，哈萨克斯坦，阿塞拜疆，塔吉克斯坦，吉尔吉斯斯坦）的83位作者的参与。

这次会议的召开，是学术界，中国国家权力机关和中国共产党对维护和加强科学领域国际合作的高度重视的结果。我们还要感谢我们的俄罗斯合作伙伴无限出版社协助组织会议，准备和发布中英文会议文集。

我希望会议的收集对广大读者有用，将有助于在新的观点下为读者提供有趣的问题，并且还将允许在共同利益的科学家中寻找联系。

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"战略银行管理" 定义的方法
APPROACHES TO THE DEFINITION
OF "STRATEGIC BANKING MANAGEMENT"

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注解。 目前，银行业的情况是由于一些波动和周期性变化。 在这种情况下，有必要制定一些具体的措施，一个长期性的管理决策体系。 因此，战略银行管理正在成为银行业不可或缺的一部分。

关键词：银行管理，银行管理方向，战略，战略规划，战略银行管理。

Annotation. *Currently, the situation in the banking sector is due to some fluctuations and periodic changes. Under such conditions, it is necessary to create a number of certain measures, a system of management decisions of a long-term character. Therefore, strategic banking management is becoming an indispensable part of banking.*

Keywords: *banking management, directions of banking management, strategy, strategic planning, strategic banking management.*

The bank, as a specific type of commercial enterprise, has many objectives that are achieved with the help of competently implemented and carefully thought-out management. For more global tasks, the formulation of which is determined by the direction of development of a credit institution, there is strategic banking management.

According to O.I. Lavrushin, "the activity of any commercial enterprise in a market economy requires appropriate management, without which it is impossible to achieve the goals of an en-terprise, ensure its competitiveness and efficiency of activity" [3, p. 19].

The concept of "strategic banking management" is rarely found in educational and periodical literature. For example, Kosterina T. M. identifies strategic (general) management, financial management and personnel management. In her opinion,

strategic (general) management includes defining the general concept of developing a credit institution, setting goals and specific objectives of the activity, developing measures for realizing the goals set, forming the optimal organizational structure of the bank as a factor in organizing the effective activity of the bank [5, p. 254].

Mostly, the authors interpret the concepts of "bank management", "strategy", "strategic planning". Therefore, having considered the approaches to the definition of the above-listed terms, we can formulate a full-fledged definition of strategic banking management.

So, for example, Lavrushin O. I. does not give an unambiguous definition of banking management, but indicates that it consists of financial management and personnel management. In addition, each element of banking management has its own directions (Fig. 1.).

Финансовый менеджмент	Управление персоналом
■ Стратегическое и текущее планирование ■ Формирование банковской политики ■ Маркетинг ■ Управление активами ■ Управление пассивами ■ Управление ликвидностью ■ Управление доходностью ■ Управление активами и пассивами ■ Управление собственным капиталом ■ Управление кредитным портфелем ■ Управление портфелем ценных бумаг ■ Управление рисками (валютным, процентным, операционным, риском забалансовых операций и др.) ■ Создание информационной системы	■ Мотивация труда ■ Организационная структура банка ■ Расстановка кадров ■ Система подготовки и переподготовки кадров ■ Механизм оплаты труда, поощрений и стимулирования ■ Организация внутреннего контроля ■ Организация внутреннего контроля ■ Система повышения в должности ■ Принципы общения в коллективе

***Fig.1.** Directions of banking management [3, p. 24]*

Table 1 presents the approaches of various authors to the definition of bank management

Table 1

Definition of bank management by various authors

Author	Definition
Kosterina T. M.	"Bank management is an independent type of professional activity in a credit organization" [5, p. 254].
Akhmadeev M. G., Shakirov D. T.	"Banking management is a system of managerial influences produced by relevant organizational structures that ensure the continuity and timeliness of credit resources in order to achieve micro- and macroeconomic advantages" [1, p. 40].

* Source: compiled by the author.

Continued table

Author	Definition
Kurilova A. A., Gorodnicheva M. A.	"Banking management is an autonomous type of professional management activity, which is aimed at achieving specific goals through the rational use of banking and labor resources with the use of its special principles, functions and methods" [6, p. 78].
Ioda I.V., Unanyan I.R.	"Banking management is a management system of a credit institution based on the use of modern effective forms, means and methods of banking management in a market economy. It represents the impact of the subject of management on the control object to achieve the goal "[2, p. 9].
Shershneva E. G., Kondyukova E. S.	"Banking management is an independent type of professional activity that provides a management process aimed at achieving the goals of the bank in terms of the market and the uncertainty of the external environment. Banking management is the management of all processes and relations of the bank: financial, economic, technical, technological, legal, social, labor "[8, p. 16].

* Source: compiled by the author.

Comparing the above definitions, we can trace the general features:

bank management is a type of activity ;

- bank management implies a system of management actions

- bank management aims to achieve certain goals through the use of available resources.

Recently, changes in banking have been traced, which are associated with the growing integration of international financial markets, the improvement of information technologies, competition and increasing customer demands. According to N.A. Tysyachnikova and Yu.N. Yudenkov, "... if before the crisis, the leader was the bank that quickly introduced a new service, now competition in the banking market has become a struggle of strategies" [7, p. 5].

The bank's strategy is the conceptual basis of its activities, defining priority goals and objectives and ways to achieve them. It serves as a guideline for making key decisions regarding future markets, products, organizational structure, profitability and risk profile for managers (managers) of the bank at all levels of its activities; banking management systems" [7, p. 6].

Table 2 presents the approaches of various authors to the definition of strategic planning

Definition of strategic planning by various authors

Author	Definition
Tysyachnikova N. A., Yudenkov Y. N.	"Strategic planning in banks is applicable to any problem that is related to the global goals of the bank, is focused on the future, and affects external factors influencing the results of the bank's activities. Strategic planning cannot exist outside of strategic management, which is a dynamic set of management decisions based on a common base — a strategy "[7, p. 6].
Rovensky Y. A., Rusanov Y. Y.	"Strategic planning is a set of actions and decisions taken by the commercial bank's stakeholders, resulting in the development of specific strategies designed to enable the banking organization to achieve its goals. Strategic planning forms the basis for all managerial decisions, since the strategic planning process becomes the element without which it is impossible to fulfill all the basic managerial functions. Strategic planning is a managerial activity to create and maintain strategic consistency between the goals of a banking organization, its potential to achieve key strategic advantages "[4, p. 117].

* Source: compiled by the author.

According to the above definitions, strategic planning has a wider content than bank management: globality of goals, identification of potential opportunities, development of a development strategy.

Thus, having considered the concepts of "bank management", "strategy" and "strategic planning", one can summarize these terms and formulate a full-fledged definition. Strategic banking management is not only a basis for management decisions, but also a separate type of credit organization activity based on setting global objectives, developing a bank development strategy, identifying potential opportunities for determining competitive advantages and aimed at achieving maximum efficiency within a given goal.

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区域经济创新发展的财政方面
FINANCIAL ASPECTS OF INNOVATIVE DEVELOPMENT OF THE ECONOMY OF THE REGION

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注解。　国家经济的创新可持续发展进程在很大程度上取决于使用有效的金融和信贷管理杠杆，并与区域经济体系运作和监管的新方法和杠杆和激励相关联。　本文就创新层面区域经济发展的金融和信贷影响机制提出了建议，旨在以市场为基础，以区域创新发展为目标，巩固国家和区域经济。

关键词：区域经济，国家监管，经济管理机制，创新发展，金融杠杆和激励机制。

Annotation. The processes of innovative sustainable development of the economy of the country's regions largely depend on the use of effective levers of financial and credit management and correlate with new approaches and levers and incentives for the functioning and regulation of the regional economy system. The article provides recommendations on the mechanism of financial and credit impact on the development of regional economic at the innovation level, aimed at consolidating the national and regional economy on a market basis with the goal of innovative development of the regions.

Keywords: regional economy, state regulation, economic management mechanism, innovative development, financial and leverage and incentives.

In the process of developing market transformations in Russia, a rather controversial and difficult situation has developed to ensure its sustainable development and the development of its regions on an innovative basis. According to many regional statisticians, in Russia only 17.3% of the total number of operating enterprises can be considered as innovatively active, there are those who are introducing new technologies, updating the range of products. If we compare with the

leading Western European countries, where 60% of the functioning enterprises are actively engaged in innovation activity, it can be argued that in Russia the level and pace of innovation development is extremely low.

Some improvement in recent years, the situation with the general revival of innovation does not solve the problem. Among the reasons for this negative trend are the lack of financial resources for the implementation of innovative projects, as well as the imperfection of the financial and credit policy in the innovative mechanisms (methods, approaches, levers and incentives) of the economic spheres, which, in turn, does not allow for the transition economy to a qualitatively new level, and therefore - to ensure its competitiveness in a global world.

In the conditions of market transformations at the regional level, the achievement of the socio-economic stabilization of society is of particular importance. development of investment and innovation. That is why the financial and credit mechanism of innovation, as one of the main components of ensuring sustainable regional development, should become the core of attention of the state and government institutions, which implies the mandatory formation of a direction for its improvement.

The purpose of the article is to study the problematic aspects of improving the financial and credit mechanism of innovative development and justify incentives and levers to ensure the sustainable development of the regional economy on an innovative basis, and consolidate the socio-economic areas of regional development. The experience of Western European countries in ensuring regional economic development has repeatedly shown that not only the amount of financial resources generated, but also (most importantly) the existence of effective motivational mechanisms used in economic entities is of great importance for accelerating it.

In the regional aspect, the financial and credit aspects of the sustainable development of the regional economy are carried out with the aim of achieving the sustainable development of the regions, combining economic, social and other interests of the national and regional level. For the innovative development of the regions of the country, the formation and implementation of appropriate mechanisms based on the use of appropriate levers and incentives, which are widely used in domestic and foreign practice of budget, tax and monetary-monetary [1], is particularly important.

It should be noted that for the financial and credit mechanism of innovative development of the region, it is important to take into account the territorial aspect, because the region is not just a separate administrative unit, but a specific territory with certain natural, geopolitical, economic, demographic and other features, under the influence of which choice and justification are made. appropriate levers of the financial and credit mechanism of the region's investment development.

Thus, the use of the budget mechanism to increase the effectiveness of state support for innovation can be carried out in the following main areas: a system of measures for the innovative development of regions that has been included in the relevant government programs that will be implemented directly from the state budget; a mechanism to support the development of regions through subventions provided for in the state budget; support of innovative development programs by compensation by the state of interest on loans taken to implement these programs.

For most regions of the country, the system of subsidies is the main source of financial support for regional development at the expense of budget funds. At the same time, the analysis of the system of subventions indicates the presence of significant shortcomings that require appropriate changes in order to correct or eliminate them, in particular, the disunity of highly specialized subventions and the gradual elimination of the main ones for investment-innovative projects and social protection programs, a rather complicated procedure for approving subventions and the lack of proper criteria and rules for their distribution, the absence of a special law on subvention, etc. [2].

Issues related to the use of subventions are closely related to another support mechanism - compensation at the expense of the state budget for interest on loans received that are used to finance regional innovation programs. This approach is more market-oriented, since local authorities do not simply become recipients of funds, but must also look for more favorable conditions for themselves in the financial sector. Two points can be singled out that require improvement in the interest repayment mechanism: the provision of more rights to regions for the choice of authorized banks; subject to approval in the budget of an innovation project, they should immediately have the right to subject loans to the implementation of the project, which will then be partially repaid with budget funds, which will allow starting projects at the beginning of the year (and not from the end) and complete them in time.

The issue of using regional development budgets for their own purposes is directly related to another possible factor of financial support for the region's innovative development - pooling funds from several budgets for joint programs. Such a union is necessary to achieve the necessary level of concentration of resources in the implementation of capital-intensive projects, the results of which are needed by all neighboring regions, for example, the construction of transport communications, infrastructure facilities, enterprises providing communal needs. At the same time, there is no corresponding legal and regulatory framework for the mechanisms of association, necessitating a review of the existing mechanism for resolving issues of pooling funds of budgets of various local communities.

To address this issue, it is necessary to take the following measures: develop appropriate provisions governing requirements and criteria for projects into which

funds from several budgets are allowed, as well as requirements and criteria for pooling funds provided in the form of subventions; Creation of appropriate mechanisms at the regional level for financing and managing innovation development programs in the region, envisaging the pooling of funds from several budgets.

Also, one of the levers of financial and credit incentives is to apply to regional producers, which are among the priority sectors of the economy, produce innovative and export products, government reimbursement (full and partial) of interest rates on loans sent to innovative projects and local budgets. At the same time, the recipients of such loans pay interest at a lower (compared to the market) rate. Here, in particular, such a mechanism can be used: the more an enterprise has spent its own resources to finance innovative projects in previous periods, the more, respectively, the amount of a long-term innovative loan can be provided by the bank and guaranteed by the state [3].

The conducted studies suggest that an important role in the innovation development of regions is played by the existence of effective motivational mechanisms aimed at increasing the interest of economic actors in innovation processes, enhancing innovation in the regions through the use of appropriate mechanisms to strategize the objectives of the regional economy. From this point of view, it is advisable to apply levers of financial and credit incentives, ensuring the direction of financial resources in sectors of the economy in order to solve certain state priorities in the direction of economic restructuring.

At present, it is necessary to use these levers rationally, based on the provisions of numerous targeted regional programs that have a clear innovative focus. Therefore, there is a need for comprehensive analysis and inventory of sources of financial resources in the regions for the purposes of innovative development. This will help to identify the real picture of the direction of funds for innovative development of the regions and to assess the effectiveness of their use.

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法律领域学生专业英语教学的特点
PECULIARITIES OF PROFESSIONALLY-ORIENTED ENGLISH LANGUAGE TEACHING OF STUDENTS IN LEGAL SPHERE

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注解。　本文论述了专业英语教学的问题，以及向法学院学生英语教学的目标和方法问题。
关键词：专业教学，知识与技能，专业能力，相关专业任务。

Annotation*. The article deals with the matters of professional-oriented teaching of English as well as learning the objectives and methodological issues of English language teaching to law students.*

Keywords: *professional-oriented teaching, knowledge and skills, professional competence, relevant professional tasks.*

The main task of the higher education is in development of creative personality of the specialist capable for innovation. In modern society there are required the competitive specialists mastered not only the basic foreign language from the university program but also a professionally–oriented one applicable in the specialty. Timeliness of this issue is undoubted in the age of globalization of economy, integration of political, cultural and social life. Thus the main task at the present stage of the society's development for English language teachers in modern law schools is getting the application of up-to-date techniques for the foreign language, teaching in the legal sphere.

In current environments the role of active methods in the practice of professional-oriented foreign language teaching continues to be extremely relevant. One of the main reasons for this relevance is the limited number of hours for development of the following disciplines: "Foreign Language in the Law", "Foreign Language in Legal Activity". The main problem that there are deep differences between Russian codified statute and Anglo-American case law. In this case it is impossible any understanding of special literature without background knowledge.

The learning environments for professionally-oriented English language teaching of law school students are reading and translation of authentic texts, need-to-know the common used words and legal terms, development of skills for independent work in creating a terminology glossary on the law topics, mastering the skills of spoken professional language. «Today the main task of foreign language teaching is in teaching for professional-oriented communication" [1], and the training process itself should be practice-oriented.

The correct approach to the content for teaching to communicate taking into account the professional specifics, the characteristics of the subject area of law language functioning is one of the factors serving for the effective organization of the educational process.

Commitment to specific interests and needs of students, taking into account the requirements to the future professional activity, makes up the specifics of the training content for professional-oriented communication in English at law faculties and higher law schools.

The matter of professional training for teaching English in jurisprudence and legal activity at law faculties and institutes is still relevant. Therefore, foreign language educators constantly need in new technological support. The correct application of legal terms also causes particular difficulty in teaching law students because the same term has a different meaning in Russian and English. For the language of law it is characteristic the presence of large number of legal terms required for students acquiring. In the course of professional communication the definitions from various fields of legal activity can be demanded. However, the university English language course cannot provide for all areas professional interaction fully covering the entire subject area of the legal profession. As a result it is necessary to establish some vocational minimum coordinated with the core departments of the university. It is also important to transfer the skills of professional formal communication and, not unimportant, the ability of students to use the terminological dictionaries, as well as teaching for skills of writing..

One of the goals of the vocational training is the development of the specialist's personality effectively performing his work. In other works the vocational training should provide not only the acquisition of skill and knowledge including communicative competence in English but also "the development of professionally significant personal qualities" in connection with it the social aspect of any professionally-oriented education is enhanced and made significant [2]. The problem of vocational-oriented teaching English for law students is in the first place that the level of proficiency in a foreign language by law students does not meet modern requirements.

The reason for this as it seems to us is that the method of teaching foreign languages by learning the certain number of lexical units to translate legal documents and texts has exhausted itself.

Any professionally-oriented teaching of English language implies the active interaction of all participants in the educational process during which there is a mutually useful general exchange by information in foreign language, the acquisition of communication skills to solve professional issues.

A graduate of a law school must be prepared for practical work, for socially-demanded and socially acceptable realization of his professional, intellectual and creative potential. These competences might be formed only in the process of interactive communication technologies learning aimed for qualitative changes in the education system. First of all, the actual use of the Internet as the information base.

Any man of today beginning from his early age becomes a computer and Internet user. The Internet is a source of modern authentic materials, educational sites and a method of projects. In this regard there is a modification of traditional forms of education. The great advantage of interactive communication technologies when getting English professional-oriented training of law students is the possibility of the necessary information acquisition in the shortest period of time. It should be also considered as positive that the Internet provides the learning environment with constant access to the information resources of teachers and students according to the educational process. Many professionally-oriented materials are taken from the Internet for quick enter the living vocabulary improvement of communication skills [3].

The disadvantage of Internet resources using is not just the application of electronic dictionaries by students and the frequent use of electronic translators that leads to the lack of creative approaches to translation of professional texts and documents slows down the mastering and memorization of law terms and terminological word combinations, leads to errors in the translated legal materials. Electronic translators do not give the absolutely correct translation of the special texts and especially law documents because the purpose of these computer programs is not in translation of specialized materials. In this case there is required the term base and in our case, the legal terms dictionary.

The innovative technologies also include the case method or the method of solving situational problems. It includes the modeling, game methods, discussions, performing the certain functions.

From the point of view of some scientists the pedagogical potential of the case method is much higher than that of traditional teaching methods. The purpose of this method is the development of students' abilities to make decisions on situational problems of professional orientation in English.

The development of professional communication skills is the main, purposeful and rather complicated task facing the educators teaching a professionally-oriented law foreign language. Therefore, it should be found some universal method of

teaching professionally-oriented foreign language that will allow to achieve the higher level of specialists' training through integration of language and professional sphere.

Knowledge of foreign languages and especially in professional sphere, here in legal sphere, provides an increase of the professional competence level of any specialist including legal professions. It should be also noted that English language knowledge increases the possibility of law students to obtain employment and in their career growth.

To solve this complex problem it is necessary from one hand to improve the existing methods and approaches to studies and from the other hand not to ignore and deny all the old time-tested techniques. Modern and proven on practice methods of teaching professionally-oriented foreign languages in higher education institutions of law should be used in combination with each other or in parallel to reach the most advanced result.

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心理治疗师社会教育培训在研究生教育体系中的作用和重要性
THE ROLE AND IMPORTANCE OF SOCIO-PEDAGOGICAL TRAINING OF PSYCHOTHERAPISTS IN THE SYSTEM OF THEIR POSTGRADUATE EDUCATION

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抽象。本文考虑了心理治疗师的社会教育培训在其职业发展和进一步培训系统中的作用和重要性。作者认为，应该为心理治疗师的社会教育文化形成一个特殊的教学系统。该系统应考虑成人从业者学习过程实施（研究生教育）的法律规则和原则。作者认为，社会教育技术将帮助心理治疗师理解并全面分析患者（客户）的问题情况。此外，社会教学理论和实践的知识将有助于心理治疗师了解社会适应过程的问题领域，以及患者（客户的）社会化。本文简要分析了医学高中实施心理治疗师专业发展课程的经验。
关键词：社会教育学，心理治疗师，专业发展系统，社会教育文化，跨学科，综合方法，协同方法。
Abstract. *The article considers the role and importance of socio-pedagogical training of psychotherapists in the system of their professional development and further training. The authors believe that a special didactic system should be developed for socio-pedagogical culture of psychotherapists formation. This system should take into account the andragogical laws, principles of the learning process implementation (postgraduate education) of adult practitioners. The authors think that socio-pedagogical techniques will help a psychotherapist in understanding, and comprehensive analysis of his patient`s (client`s) problem situation. Also, knowledge of socio-pedagogical theories and practices will help a psychotherapist to understand the problem areas of social adaptation processes,*

and patient`s (client`s) socialization. The article presents a brief analysis of medical high schools` experience in the implementation of psychotherapists` professional development course programs.

*   **Keywords:** social pedagogy, psychotherapists, professional development system, socio-pedagogical culture, interdisciplinary, integrative approach, synergetic approach.*

Modern Russian society needs highly qualified psychotherapists who are competent in the field of synergetic approach to the process of providing clients (patients) with medical-therapeutic, psychological services. Under the synergetic approach, we understand the ability (as well as skill and willingness) of a psychotherapist in the process of complex (in organic unity and interrelation) assisting a client (patient) to apply variable methods of psychological, socio-pedagogical, and medical impact to resolve the problem situation in human mental health.

Today, many people (even with medical education) quite often cannot clearly (exactly) explain the fundamental differences in professional activities of specialists such as "psychotherapist", "psychiatrist", "psychologist".

In the minds of many ordinary people (as they are called "man in the street") there is considerable confusion associated with the essence of "psychotherapy" concept.

This article will focus on the content of psychotherapists` additional professional education (refresher courses, professional retraining) programs. Therefore, we consider it is appropriate to explain the differences in professional activities of these specialists (psychotherapists) and psychiatrists, practical psychologists.

Psychiatrist is a specialist who has a higher rather narrow medical education. The specialist is generally engaged in medical treatment (provide psychotropic drugs) of serious (severe) disease (illnesses) of the mind and nervous system.

A person who does not have a higher medical education, but has a higher education, which he received at university in the direction of training "Psychology" can work as a psychologist. It is important that a psychologist does not prescribe drugs to his clients (pharmacological preparations), he ideally works only with so called healthy people. The essence of professional activity of a psychologist is a joint search with a client (at the level of verbal, question-answer, meaning-forming communication) of variable ways to resolve a problem situation (intrapersonal, interpersonal, personal-group, etc.).

Psychotherapist (according to the applied in the Russian Federation standards) is a certified specialist with higher medical education (this is usually a psychiatrist, neurologist, neuropathologist, and sometimes a pediatrician), who necessarily passed (studied) a program of additional professional training "Psychotherapy" (received a document of the established medical high school sample).

The therapist in his professional practice (unlike a psychologist) may use medications (psychotropic group drugs). However, (unlike a psychiatrist) therapist heals, as a rule, mild or moderate mental disorders of mild. In the course of his work (in the course of interpersonal interaction with a patient), a psychotherapist provides professional psychological assistance to a patient (client), using the entire arsenal of psychological tools, techniques, tactics, as well as all types of psychotherapy such as words with therapeutic effect on human psyche, art (art therapy), motor activity, etc.

As a part of the world practice, psychotherapists are designed to help a client (patient) to realize (understand, comprehend) the true motivation of their actions (activities), as well as to help to find ways to solve mental problems of an individual, which largely (to the extent) cause the presence of patient's psychosomatic diseases (they are usually cardiovascular system, gastrointestinal tract, respiratory system, etc. disease). A psychotherapist through effective resolution of client`s psychological problems contributes to his bodily problems resolution.

In general, a therapist is engaged in depression, neuroses, panic attacks, anxiety and neurosis-like states treatment. In the case of productive personal interaction with a patient (client), a psychotherapist helps him to overcome mental trauma pain, increase self-esteem, manage his psycho-emotional state, control his negative emotions manifestations, helps to learn how to communicate with other people effectively, etc.

Highly professional psychotherapists in their work seek to minimize drugs prescription, try to strengthen their verbal (word) impact on a client (patient), practice the usage of such techniques synthesis as body-oriented therapy, transactional analysis, hypnosis, cognitive behavioral psychotherapy, gestalt therapy, client-centered therapy, psychoanalysis, etc.

The professional activity of a psychotherapist is extremely complex and multifaceted. After all, in the case of low professionalism of a psychotherapist, there is a high risk of harming the mental health of a patient (client).

It should be noted that today in Russia there is no "Psychotherapist" professional standard. This fact causes a number of problems in professional training of psychotherapists (it is enough to view the content of discussions on such organizations as All-Russian Professional Psychotherapeutic League, Association of Medical (Clinical) Psychologists, etc. websites). However, it should be noted that there is a FGES for higher education in the training of highly qualified personnel in residency in specialty 31.08.22 Psychotherapy. According to this document, a university independently determines the set of academic disciplines. In general, professional training of psychotherapists in residency includes the synthesis of knowledge, skills, competencies in the field of medicine, pharmacology, psychiatry, psychology. And unfortunately, in this preparation there are no even inclu-

sions of social and pedagogical knowledge, and abilities. The analysis of training courses programs (from 72 to 280 hours) of a number of medical universities of the Russian Federation on the subject of "Psychotherapy" showed that they do not represent even minimum of socio-pedagogical knowledge. Meanwhile, such knowledge and skills can enhance the professionalism of psychotherapists-practitioners. Because the study of such topics of social pedagogy as a socio-pedagogical victimology, socio-pedagogical deviantology, socio-pedagogical familistic, ethno pedagogy, social pedagogical deontology, etc. can help a therapist in understanding the reasons for family problems of a patient (client), in establishment of causal relationships in explanation of those or other deviations in his behavior, in understanding ethno-cultural specifics of the client`s mentality.

Therefore, we consider it is appropriate to focus on the need to include in training and retraining programs on the subject of "Psychotherapy" sections of socio-pedagogical profile.

First, a few words about the specifics of professional development and retraining of medical personnel in our country.

In the national doctrine of education in the Russian Federation until 2025 it is noted that the country has all the conditions for systematic training and retraining of specialists in various fields. However, we can say that in the Russian Federation over the past ten years there has been a situation of permanent modernization of the system of continuous professional education (CPE) of medical personnel. Leading experts in the field of additional professional education of physicians are actively searching for new forms, methods, tools, technologies to improve the skills of medical personnel.

In general, it can be argued that in the system of additional professional education of physicians there is a tendency of anthropocentricity, i.e. in the courses of advanced training, professional training of physicians they implement personality-oriented, personalized approaches to each student of the courses. As well as the content of courses of additional professional education of physicians focuses them on the implementation in their professional activities of anthropological approach to their patient's personality. And this, in our opinion, can be fully realized only if a physician has at least minimal socio-pedagogical knowledge and competencies.

Now, the main task in the development and implementation of continuing professional education (CPE) programs of medical personnel is not to adapt the course participants to additional professional and educational environment, but such environment modeling depending on needs, and opportunities of both a separate (specific) adult learner (doctor-practice), and a group of students as a whole.

Systematic passage of refresher courses, programs of additional professional education, which include the module of socio-pedagogical knowledge and techniques development, by a psychotherapist is very important for personal and professional self-development of a specialist.

In the process of teaching psychotherapists in the system of additional professional education of socio-pedagogical modules, it is important to focus on the individual-subjective, personally significant aspects of educational process of adults (practitioners) – to identify (diagnose) value orientations of course programs students, their individual-personal and professional attitudes, to determine (if possible) the attitude to themselves and other people, to identify their mood (motivation) to study the socio-pedagogical module, to get acquainted with socio-pedagogical methods and their usage in professional experience of other specialists [1; 2; 4].

It should be noted that teachers of socio-pedagogical module of course programs in additional professional education of psychotherapists should understand well the internal mechanisms of professional and personal self-development of each student. It influences the adoption (or rejection) of new socio-pedagogical knowledge and techniques that can be important for both personal and professional growth of a psychotherapist, and understanding of their own (individual-subject) features of the processes of socialization, social education, social adaptation, etc. It is important that in the process of studying socio-pedagogical module of the course programs of additional professional education of psychotherapists, students (practitioners) get a desire to independently (in future) master socio-pedagogical theories, methods, and techniques that interest them.

Teachers of socio-pedagogical module of the course programs of additional professional education of psychotherapists have an excellent opportunity in the process of training to develop professional reflection of practitioners who can apply new socio-pedagogical knowledge for self-analysis of their professional experience situations, individual cases of work with clients. Note that this method of development in the training courses of professional reflection of practitioners (psychotherapists) is of great importance for the development of professional thinking of a specialist, and also affects the development of socio-perceptive and emotional-value components of his professional culture [3; 7].

The study by psychotherapists socio-pedagogical module in the course programs of additional professional education will also contribute to the development of practitioners` communicative and deontological culture. As in the process of studying the material of socio-pedagogical module there will be presented theories and methods of social communication, deontology of relationships in the "professional – client" from social pedagogy perspective.

In the process of development within the framework of the course programs of additional professional education by practitioners (psychotherapists) of socio-pedagogical module, it is necessary to provide subject-subject interaction in the system "teacher of courses – course listener", to ensure the co-creation of teachers and students in the search for solutions (from the perspective of social pedagogy) of real problem situations that occur in the professional activity of a psychotherapist.

The professional and educational process at the courses of advanced training of psychotherapists during the development of socio-pedagogical module should activate their (practitioners) own personal and professional opportunities.

As the authors` professional experience have shown the study of socio-pedagogical module in the proses of advanced training courses, courses of professional retraining of psychotherapists creates, as a rule, in the audience a special reflective environment, as a lot of new for psychotherapists socio-pedagogical knowledge they seek to immediately apply both to explain certain moments of their own life experience, and to understand the problems of their clients [5; 6]. For example, for many psychotherapists completely new knowledge is socio-pedagogical concepts of the emergence and development of youth, youth subcultures and their impact on the development of a personality, socio-pedagogical theories of victimization of an individual in the process of socialization, socio-pedagogical theories of religion as a micro factor of socialization, etc.

All of the above allows us to talk about the need for socio-pedagogical culture formation in a system of training, courses of professional retraining of psychotherapists. To form this culture, teachers of socio-pedagogical module should develop a local didactic system that would take into account andragogic laws, principles of professional and educational process of adult practitioners, as well as current level of psychological and pedagogical training of students.

The local didactic system should include methodical techniques, techniques of studying by adult professionals (with well-established views, sometimes stereotypes) new socio-pedagogical material; methodical techniques, techniques of understanding the studied material, its application to solve the problems of professional activity; methodical techniques, techniques of controlling the assimilation of program socio-pedagogical material.

Today, in conditions of increasing competition between universities (including medical universities), the opportunity to offer students a new content-technological approach that will improve the quality of their training is a competitive advantage. The authors of this article experience on inclusion in the program of training courses and professional retraining of psychotherapists of modules on the study of socio-pedagogical theories, and techniques has shown that new knowledge, skills enrich professional tools of a specialist, expand his professional horizons, contribute to positive results in the healing of patients.

In general, socio-pedagogical knowledge, knowledge of socio-pedagogical techniques can significantly help a psychotherapist in creating an objective (comprehensively considered) picture of a problem situation in the life of his client (patient). Systemic knowledge in the field of socio-pedagogical theories and practices contributes to a psychotherapist's understanding by a specialist problem areas of socialization, social adaptation of his client.

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学生青年的职业定位
CAREER ORIENTATIONS OF STUDENTS YOUTH

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抽象。 考虑了学生青年职业和职业取向问题的理论和实证方面。 展示了使用 E. Shane的"职业锚"进行学生青年社会心理学研究的可能性。 已经介绍了对学生职业定向研究结果的回顾。 与价值关系形成的本质和价值观本身相关的职业取向存在与否的社会心理学原因。

关键词: 学生青年, 价值取向, 人格动机, 分层社会群体, 职业取向

Abstract. *The theoretical and empirical aspects of the problem of career and career orientations of student youth are considered. The possibility of using the "anchor of the career" of E. Shane for the socio-psychological research of student youth is shown. A review of the results of a study of career orientations of students has been presented. Socio-psychological reasons for the presence or absence of career orientations associated with the nature of the formation of value relationships and the values themselves.*

Keywords*: student youth, value orientations, personality motivation, stratified social group, career orientation*

In today's rapidly changing world, despite a lot of sociological, psychological and other scientific research, with different approaches to the problem, there is no common understanding of the philosophical essence of young people. We pay attention to the definition of the well-known psychologist and sociologist I.S. Con, who studied the manifestations, methods and forms of organization of mental phenomena in various fields of human activity. From his point of view, "Youth is a socio-demographic group that is distinguished on the basis of a combination of age characteristics, social characteristics and social and psychological properties determined by those and other factors" [1, p. 85]. We note that the substantive

definition of the student part of it is of particular difficulty, since it has a wide spectrum of landmarks in its scientific, educational, and daily life activity. The students is a social group in the space of a university, aimed at accumulating intellectual and functional potential for its subsequent realization in social production and fulfilling a social role in the spiritual development of society. The system of social development includes in its structure many factors, including economic, political, cultural character in their integral totality and in a strong socio-psychological connection. Such a relationship structures the quality of the whole, which has an independent development that generates the vectors of value orientations of each stratified social group.

In connection with the above, we note that in the conditions of social transformations and frequent changes in psychological, pedagogical and moral orientations, both in general education and in higher education, a student finds himself in a situation of uncertainty, disruption of motivation and falls into a state of apathy towards his own future and future. of society. The philosophy of education and the theory of pedagogy in these conditions are also in a quandary, there is a systemic crisis of the educational process as a whole. In the absence of meaningful and scientifically grounded decisions, the educational system actively adapts to immediate social needs, which, obviously, hardly has the prospect of positive feedback from the sustainability of the creative development of social relations and the creation of a basis for civilizational development.

Attempts by higher education institutions to solve the problem of the formation of a person's personality capable of professional and adaptive life through educational standards by introducing the formulated norms of activity and relationships in the form of competencies because of their imperfection are unlikely to lead to a solution of the transition problem a student is a sought-after specialist. In the era of "Industrial Revolution 4.0" [2], there is a change in the content and structure of the profession, covering both the dynamics of the functions of a specialist and his intellectual potential. As a result, the motivational picture of the world changes dramatically, leading to uncertainty in the choice of a profession. A student in the course of studying in a higher education institution for a particular specialty needs help not only of vocational training, but also psychological (in some particular, psychotherapeutic) in order to maintain his motivational interest in a future profession or change his profession with minimal losses. This approach is needed in order not to overload the labor market of young specialists not only by the lack of demand for a university graduate as a specialist, but also by reducing the number of carefree unemployed people with higher professional education who do not have any motivation for community life.

We believe that the solution to this problem is a complex psycho-social and socio-political problem. First of all, it is necessary to determine the strategy for

solving a complex problem, including subject-specific determinations, spatio-temporal development of personality development, disclosure of the grounds that allow the combination of personal interests and motivations with social needs. The whole set of these problems is considered in the psychological, pedagogical and social studies of career orientations.

It is known that the problem of career and career orientations is the subject of interdisciplinary research. In the study of career orientation of students in general terms, as a rule, they associate it with professional behavior, activity in a specialty chosen by a student, obtained in a university. Consequently, "Career orientations are the meaning that a person wants to realize when choosing and implementing their professional development, an individual combination and sequence of realization of professional plans related to experience and activity in the field of work throughout life" [3, 82]. In most works, the career development vector is considered as an algebraic sum of the vertical and horizontal component according to their degree of fullness, which, according to the career anchor method of the American psychologist E. Shein (Edgar H. Schein), is an integral set of the following career orientations: professional competence, management, autonomy (independence), stability, challenge, integration of lifestyles, entrepreneurship (cited in [4]). Moreover, the author of the method believes that it is the career setting that arises in our view, as an interference pattern of the addition of all components, is a key factor in managing an individual career, giving it originality and uniqueness.

Thus, the student youth with an emphasis on a stratified social group, is the object of our study. As a subject of research, we consider part of the transition problem a student is a sought-after specialist, that is, career orientations of a subject of higher professional education from the point of view of finding out the reasons for the presence or absence of certain motivations to formulate their own goals and attitudes.

The aim of the work is a systematic analysis of the career orientations of the student youth in order to ascertain the socio-psychological and personal value bases necessary for the subject of education to formulate his own motivated goals and attitudes.

Since the study is devoted to the establishment of social and psychological value bases related both to the personality of the subject of vocational education and the social climate for the implementation of his own plans, then, first of all, one should understand and accept a categorical view of them. From the point of view of philosophy, the category "Value basis in the case of a person and society is the meaning and justification of the choices of implementing projects going from the single to the universal" [5, 17]. The socio-psychological approach focuses on the fact that values have not only a rational, but also an emotional component. Values express the spiritual and mental energy of the subject, which is realized in his life activity, filling it with its meaning under the influence of internal spiritual experiences.

The study of value orientations in psychological science in the context of analyzing the prospects for professional socialization and personal growth of student youth involves identifying factors that contribute to the formation of the spiritual and axiological bases for its successful career. Signs of career and value orientations of student youth in their basis represent the socio-psychological integrity.

Analysis of the scientific literature shows that the problem of the essence of career orientation is devoted quite a lot of work of socio-psychological orientation. They reveal the concept and content of career orientations, types, main development trends in individual professional groups, and psychological conditions for optimizing the development of career orientations.

For example, the authors of "Personal Types of Building an Entrepreneurial Career" [6] note that the prevailing career orientations of students - future entrepreneurs are: the integration of lifestyles, entrepreneurship and management, which indicates the presence of a developed desire for self-realization in work, personal readiness to act in market economy conditions. The leading values in their structure are occupied by such values as "independence", "hedonism", and "traditions". The dominance of the cognitive component, which characterizes the developed ability of independent planning and implementation of activities while taking into account external requirements, is noted. The average level of general internality, as well as internality in the sphere of achievements and professional activity is characteristic. Future entrepreneurs demonstrate the construction of their entrepreneurial career, characterized by an important feature, expressed by the degree of responsibility for their activities.

There are experimental studies of the relationship of career orientations and life principles, carried out using the projective questionnaire of principles [7]. The sample is an employee from 20 to 42 years. The results of this study show that the dominant career orientations - job stability, service and the integration of lifestyles in combination with professional competence structure life principles focused on diligence.

Of particular interest is the study of career orientations of students of psychologists [8]. We draw attention to the fact that students who get professions of a helping type are ministerial oriented. In addition, this paper identifies the relationship between the career orientations of this group of subjects and the parameters of moral self-determination. This indicates that the students of psychologists are dominated by the value orientations of the moral constructive orientation. The work shows a positive relationship between the orientation on professional competence (professional skill) and moral strategies of the obligation to observe moral standards. However, negative interrelationships of the career orientations of psychology students with entrepreneurship and the significance of morality and rectitude were found. Negative correlations of the career orientations of psychology students with management and such components of moral self-determination as reward for good and evil were also revealed.

In the key we have proposed, in addition to the career reference points of psychologists, a study of the career orientations of future teachers arises [9]. The results of this work show the predominance of career orientations among students - teachers for work stability, service and the integration of lifestyles. The ratio of career orientations to a challenge with the ability to self-management and life-meaning orientations is shown. Specialists with higher orientations to the challenge have a greater meaningfulness of life and a higher ability of self-government and goal-setting. They have a higher orientation on professional competence and management, ministry and entrepreneurship.

The study of students of economic specialties of the Khanty-Mansiysk Autonomous District in the direction of preparing Management and the State Medical University using the content analysis of the compiled summaries and SWOT questionnaires of the analysis of the opportunities and threats of the labor market in their specialty shows that respondents cannot meaningfully formulate their career self-realization paths, their professional and career goals and necessary skills, competitive advantages necessary for self-realization in their profession [10]. Young specialists of economic profile (work experience from 0 to 5 years) have dominant co-stability of work, integration of lifestyles and service.

It should be noted the relationship between the assessment of the urban environment and features of career planning, where students have differences in career orientations [11]. For students with a lower assessment of the urban environment, career orientations toward management, solving complex tasks, and promotion through the ranks are typical. Students with a higher assessment of the urban environment are more focused on the development of professional skills, stability of the place of work.

A study [12] of students of future engineers (40 people) showed the dominance of career orientations towards autonomy, management and integration of lifestyles; the least pronounced career orientation is professional competence.

A longitudinal study of career orientations, the level of career self-efficacy, and the level of motivation for the career of students of economic profile showed that there is a positive dynamics of the studied indicators from the second to the fourth year [13].

The analysis and synthesis of empirical research data on career orientations of contemporary Russian youth allowed the author [14] to draw a number of conclusions.

1. Leading career preferences of schoolchildren, students of technical schools, students have a social character.

2. During all stages of vocational training, a large part of students and students of a technical school have a low level of awareness of career preferences, their internal contradictions, lack of formation, lack of a clear hierarchy, declarativeness, current preferences do not coincide with idealized ideas about a future career.

3. The hierarchy of career preferences may vary slightly from first to final year with a low degree of variation in dominant orientations.

4. Career orientations may in part be related to gender and gender, but to a greater extent to the orientation of training and the type of activity.

5. Sexual and gender peculiarities of career orientations are manifested in the fact that girls as a whole strive for stability, security, a balanced career and family, and are oriented toward service.

6. Career orientations of students generally correspond to the nature of the profession, specialty or occupation.

7. Orientation to "management" can occur among students without a pronounced focus on a certain type of activity.

8. Orientation to the "ministry" is expressed in schoolchildren and humanities students, psychologists, students of railway specialties, technical school of food industry, design engineers, students of the Faculty of Physics and Mathematics, lawyers, and is underrepresented in students of advertising, economics and management.

9. Orientation to "professional competence" is leading or significant for law students, copywriters, engineers, and can serve as an indicator of the student's professional orientation.

10. Prospects for further research are seen in the study and the influence of various factors on the formation of career orientations of young people. At the same time, the most reliable research tool is the "Anchors of a career" questionnaire, re-adapted by A.A. Zhdanovich, it is advisable to use modifications of the questionnaire for use in the youth sample.

In [15], the authors consider the problem and give a description of socio-professional orientation from the point of view of the organizational process, highlighting the levels of development of the latter. Based on the study of the 1st year students of Minin State Pedagogical University of Nizhny Novgorod, the authors conclude about the main external factors that affect the development of the socio-professional orientation of future specialists.

A review of studies on the career orientations of students shows that they are not enough for a full theoretical and methodological substantiation of the entire cycle of formation, availability and development of the process of formation of value orientations. However, it should be noted that, first of all, it is necessary to create conditions that optimize the process of forming career orientations of students.

Socio-psychological and personal bases of career orientations are values acting as a synthetic phenomenon, including significance, meaning and experience. Socio-psychological reasons for the presence or absence of career orientations associated with the nature of the formation of value relationships and the values themselves. And they are associated with the development of the sphere of consciousness and the action of adaptive, economic, socio-cultural, unconscious factors.

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关于苏联时期巴什科尔托斯坦的国际旅游
ABOUT INTERNATIONAL TOURISM IN BASHKORTOSTAN DURING THE SOVIET PERIOD

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抽象。该文件揭示了苏联国家之一 – 巴什科尔托斯坦的出境旅游组织的国家，特征以及外国游客的接待。南乌拉尔地区位于欧洲和亚洲的交界处，拥有独特的旅游资源，但在苏联时期，没有外国游客的旅游路线。苏联公民的国际旅行和外国游客的接待是通过PJSC "Intourist" 和BMMT "Sputnik" 进行的。他们为共和国分配了一定数量的旅行券。在60年代，分配了约1,500张优惠券，在80年代，为巴什科尔托斯坦共有400多万人分配了大约8,000张优惠券。他们只能为共和国0.2%的人口提供国外休息。

外国游客在共和国乌法首都和德意志民主共和国加勒地区之间的友好关系框架内来到巴什科尔托斯坦。作为这些关系的一部分，党员，行业领袖，科学家和文化工作者代表团的双边交流，工人代表的访问组织，报纸，广播和电视的合作，交流展览的组织和照片展览的发展国民经济和文化等进行了。

友谊列车已成为一种流行的合作形式。

苏联时期，国际旅游被认为是青年人和工人最重要的国际教育形式之一。

关键词：国际旅游，PJSC "Intourist"，BMMT "Sputnik"，与社会主义国家城市的友好关系，双边代表团交流，友谊列车。

Abstract. *The paper reveals the state, features of the organization of outbound tourism and the reception of foreign tourists in one of the subjects of the Soviet state - in Bashkortostan. This region of the South Urals, located at the junction of Europe and Asia, has unique tourist resources, but in Soviet times there were no travel routes of foreign tourists. International trips of Soviet citizens and the reception of foreign tourists were carried out through the PJSC "Intourist" and BMMT "Sputnik". They allocated a certain number of travel vouchers for the*

republic. In the 60s, about 1,500 vouchers were allocated, and in the 80s, about 8,000 vouchers for more than four million people in Bashkortostan were allocated. They could provide rest abroad only for 0.2% of the population of the republic.

Foreign tourists came to Bashkortostan within the framework of friendly relations between the capital of the republic Ufa and the Galle district of the German Democratic Republic. As part of these ties, a bilateral exchange of delegations of party workers, industry leaders, scientists and cultural workers, organization of tourist visits of workers' representatives, cooperation of newspapers, radio and television, organization of exchange exhibitions and photo exhibitions on the development of national economy and culture, etc. were carried out.

Friendship trains have become a popular form of cooperation.

International tourism was considered in Soviet times as one of the most important forms of international education for young people and workers.

International tourism as a socio-economic, political and cultural phenomenon originated in England and spread throughout the world. Citizens of pre-revolutionary Russia visited foreign countries for cultural, educational, recreational, medical and recreational, educational, pilgrimage and other purposes. Foreign tourists visiting the Russian Empire were attracted to Moscow, St. Petersburg, the Caucasus and the Crimea, cruises along the Russian rivers, Siberia, the Russian winter and Russian culture.

Tourism in the Soviet era was considered as a political and cultural phenomenon, as a means of educating the new man. Under the capitalist environment, mass domestic tourism developed in the Soviet country. Despite the extreme closeness of the Soviet state, inbound and outbound tourism also developed. He was not so much an economic as a political phenomenon aimed at promoting socialism and the formation of a positive image of the country in the eyes of the world community. To serve foreign tourists in 1929, the joint-stock company Intourist was created in the USSR, which received foreign tourists and at the same time sent Russian citizens abroad.

In the USSR, people of science and culture, workers' delegations, who were supposed to tell in their homeland about the achievements of the socialist state, were received. Foreign trips of Soviet citizens were made to perform diplomatic or economic tasks, to establish cultural contacts.

On the activities of "Intourist" written a significant number of papers [1,6,7,8]. The authors of this paper investigated the history of tourism in the Republic of Bashkortostan in the 1960s – 1980s [3, 4, 5]. It is during this period that the devel-

opment of mass tourism in the Soviet country falls. International tourism has also developed at this time, but Intourist still remains a monopolist.

The purpose of this paper is to show the state and features of the organization of outbound tourism and the reception of foreign tourists at the regional level in a Soviet country on the example of Bashkortostan.

At the end of the 1950s, a new stage in the development of international tourism in the USSR began.

Conducting in Moscow the International Festival of Youth and Students in 1957, the flight of the first earthling Yu. A. Gagarin in space contributed to interest increasing to the Soviet country. The routes to the resorts of the Caucasus, the Crimea and the Black Sea coast, to the cities of Moscow, Leningrad, Kiev, Yalta, Sochi, the Golden Ring of Russia, as well as to Baikal were developed and operated. These areas were provided with tourist infrastructure. Bashkortostan was not part of the areas actively visited by tourists, therefore the reception of foreign tourists and foreign visits of residents of the republic were few.

Bashkir regional trade union council through Intourist was engaged in sending tourists abroad. The number of annual vouchers allocated to Bashkiria from the center did not exceed 800.

According to the archive of the Bashkir Regional Council of Trade Unions, it was sent to the border: in 1962, 413 people; in 1963-607; in 1964-53; in 1965 - 602 people. From an analysis of the report of the Bashkir Regional Council of Trade Unions for 1965, it follows that 791 tourists had to go abroad, and in fact, 602 people left the 19 groups, including 510 tourists through Intourist and 92 on a currency basis.

Among the tourists sent abroad on a currency-free basis, 74% were advanced workers from production and drummers of communist labor, 26.5% were citizens of indigenous nationality (Bashkirs and Tatars). 6 groups of specialists were assembled and dispatched - metallurgists, sewers, agricultural workers, state trade and consumer cooperation (TsGAOO RB. F.8897. Op 4. D.221. L.15). The report noted that it was extremely difficult to recruit teams for such tours as Hungary, Romania, Poland, Romania-Bulgaria and Poland-Czechoslovakia. Only 17 people turned out to want to go to Hungary, 1 did not go to Cuba, and not a single one to Poland - Czechoslovakia for October. Four groups planned for the trip were withdrawn, and some groups left incomplete.

One of the reasons of incompletion of the groups was the high cost of the voucher. (TsGAOO RB. F.8897. Op 4. D.167. L.1). Tourists traveling abroad had to purchase vouchers at full price.

In order to increase the number of workers as part of tourist groups traveling abroad, the Resolution of the Presidium of the All-Union Central Council of Trade Unions of October 2, 1961 allowed the leaders and innovators of production to

give preferential vouchers for trips to foreign countries. 10% of the total number of discount vouchers was issued free of charge and the rest - with tourists paying 30% of the cost of the voucher. Therefore, employees of industrial enterprises for the full cost of buying a ticket abroad are not sought. Most industrial enterprises had their own recreation centers, boarding houses, and workers rested there for free. Employees of budgetary institutions were offered vouchers abroad less often and in smaller quantities.

Not everyone could go abroad. Persons from among the foremost production workers were sent there, and as stated in the instructions, "prepared in a business and political sense". Candidacy for a tourist trip was discussed at a trade union or Komsomol meeting, and then approved or excused in the district party committee.

Refusal to travel abroad could be for various reasons: misbehavior in everyday life, drunkenness, hidden own conviction for hooliganism or conviction of a close relative. The specialists sent abroad studied the moral character of family members. So, for example, "when registering a field case for the head of the production and technical trust department "Prodmontazh" Stupak V.Ye. for a trip to Algeria with his wife, it was established that his wife at her place of residence and work was characterized as a woman of easy virtue who abuses alcoholic beverages"(TSGAOO RB. F.122. Op. 76 D.64, L.19). This travel specialist was refused.

Particularly carefully considered were the proposals to leave for capitalist and developing countries people working in defense facilities and knowledgeable in state secret information. As a rule, they were forbidden to leave.

Thus, tourists and specialists were sent to foreign countries on the basis of their political and business skills, which were able to successfully fulfill the assigned tasks and adequately represent our country abroad.

The geography of tourist trips around Intourist was quite diverse. Only in 1964, tourists from Bashkiria visited 17 foreign countries, 9 of which were capitalist.

Vouchers were offered, first of all, to the socialist countries: Bulgaria, Czechoslovakia, GDR, Romania, Hungary, and Poland. There were cruise routes on the Danube, around Europe, on West Africa, on the Baltic Sea, as well as to the capitalist countries - Finland, Austria and the most distant from us - socialist Cuba.

In 1966, it was allocated 619 trips to Bachoblsovprof on the following routes: Cuba-10, Finland -50, Bulgaria - 400, Cruise in Europe - 29, Hungary -38, GDR - 57, Cruise in West Africa -16, Cruise in the Baltic Sea - 19 (TsGAOO RB. F.8897. Op 4. D.221. L.84).

In the following decades, the number of annually sent abroad increased. In the 1980s, together with BMMT Sputnik, Bashoblsovprof sent about 8,000 people annually, which was 0.2% of the republic's residents, and, of course, could not satisfy everyone.

In Soviet times, a common form of cooperation with socialist countries was the establishment, under the control of the party, of close friendly ties between our cities and regions with the cities of socialist states. Ufa maintained such links with the Galle district in the GDR. They were established on June 16, 1964 and existed until the collapse of the socialist camp.

As part of these ties, a bilateral exchange of delegations of party workers, industry leaders, scientists and cultural workers, organization of tourist visits of workers' representatives, cooperation of newspapers, radio and television, organization of exchange exhibitions and photo exhibitions on the development of national economy and culture, etc. were carried out. ” .. (TsGAOO RB. F.122.Para 144. D 37. L. 14-15.). On this channel in the district of Galle for the 60-80-ies about 10 thousand representatives of Bashkortostan visited and about the same number of friends from Halle visited the republic. [2]

Delegations and tourists to the GDR went both on the Intourist line and on the Sputnik International Youth Tourism Bureau (BMMT) established in 1958 in the Soviet country.

“Sputnik” was created for the organization of youth, student and school tourism as a self-supporting organization, which should profit from its activities.

The main goals of the new organization are: expanding the political and cultural ties of Soviet youth with the youth of foreign countries, disseminating to foreign youth truthful information about the life of the Soviet people.

Tourist exchange of groups of young people was carried out on a currency-free basis, that is, on the terms of providing countries with equivalent services. Were developed: a system of assessment of tourist services, a catalog of bases for tourism and recreation for young people, a catalog of standard routes, a catalog of typical stay programs, a methodology for calculating the cost of stay. This system allowed in subsequent years to increase the volume of youth tourism in several times.

For a decade, the Bashkir Oblast Komsomol Committee led the organization of international tourism through Moscow. In 1967, its own Bashkir branch of the international youth tourism office “Sputnik” was established [4,5].

Every year, more than 400 boys and girls traveled through the Sputnik line to the GDR. Since 1967, the Bashkir State University and the Martin Luther Gallic University exchanged groups of 20 students each year. German students took a three-week study and language practice in Bashkiria, and BSU students in Halle. This exchange has become regular, and was very fruitful. In addition to short-term practice, both universities exchanged students for a period of up to 5 months, and also sent teachers and graduate students for internships.

Since 1968, both universities annually exchanged student construction brigades. In the 1970s and 1980s, students of oil, pedagogical, and medical institutes,

a total of 75 people, were also included in the international detachments. The program of their stay also included cultural, entertainment and educational activities.

On holiday in the pioneer camp of the Galle district from the production association "Khimprom", the city of Salavat and from the school number 86 in Ufa, annually sent groups of children of 20 people.

During these years, the number of mutually directed specialized groups of young people working in enterprises that maintain direct links with related enterprises of Galle district increased. If in 1973 in the republic one group was adopted, then in 1982 - 5 such groups were.

In 1984, the visit of the Friendship train was dedicated to the 35th anniversary of the formation of the GDR and the 40th anniversary of the Victory over fascism. It was attended by 350 residents of the republic.

In return visit in 1979 and 1982, Friendship trains brought hundreds of the best production workers from Galle to our republic.

The regional council of trade unions annually sent several tourist groups of workers, collective farmers, and specialists of the national economy to the Galle district. In 1984 alone, 140 tourists from Bashkortostan visited the Galle district.

Over the years of friendly relations, cultural exchange has acquired particular importance. From Bashkortostan to the district of Halle, 11 concert groups traveled free of charge, bringing together about 600 amateur performers. About the same number of groups of amateur artists from the Galle district visited our republic.

Close friendly contacts were also established between journalists of the newspaper Freiheit and the republican newspapers of Bashkiria. To study the editorial experience in Bashkortostan, dozens of employees of the newspaper "Freiheit" visited, and many of our journalists visited Galle.

International tourism was considered in Soviet times as one of the most important forms of international education for young people and workers. Those arriving in the GDR in Berlin visited Treptow Park and laid wreaths at the monument to the Soviet victorious soldier. Visited the city of Eisleben and a monument to V. I. Lenin, a monument to tankers at the grave in Wittenberg, visited Weimar and Buchenwald, where wreaths were laid at the monument to E. Thelmann, who died in this concentration camp.

In Bashkortostan, on the recommendation of the party leadership of the country, the achievements of the Galle district of the GDR in socialist construction, economic development and culture, welfare, expansion and strengthening of Soviet-German friendship were constantly highlighted. The newspapers published collections, essays and information under the rubric "In the Galle district". On the Bashkir television and radio regularly, at least once a month, special thematic programs were organized about the Galle district, about the development of the

economy and culture of the GDR. Every year in October, a week of feature films and newsreel films about the GDRs was held in urban cinemas and on television.

The Secretariat of the CPSU Central Committee obliged the republican party organs to carry out the necessary work. "On the occasion of the national holiday - the anniversary of the proclamation of the German Democratic Republic in enterprises, collective farms, state farms, educational institutions to hold public meetings, friendship evenings, organize photo exhibitions about the achievements of the GDR in economic and cultural construction, thematic evenings, reader conferences, film festivals, meetings and worker conversations with members of delegations and tourist groups. To devote the people of the GDR to radio and television programs, articles in republican, city and district newspapers"(TsGAOO RB. F. 122. Op.77.D. 54 L.28).

In the second half of the 80s, the ideological orientation of tourism gave the way to commercial advantage. "Intourist" since 1988 began to sell freely, rather than distribute vouchers abroad, the geography of the proposed travels has significantly expanded, but control by the state and state security agencies still remained. The number of tourists traveling abroad in Bashkortostan has increased, but not significantly.

In post-Soviet Russia, tourism is becoming one of the priority spheres of the economy. Tourist organizations are working on outbound tourism, which is developing rapidly. Bashkortostan in recent years has become more attractive for foreign tourists. In July 2015, a summit of the SCO and BRICS countries was held in Ufa, which drew the attention of the foreign public to our region. The Republic has a huge tourist potential, but as in the Soviet period, without receiving support from the federal budget, it develops tourism at its own expense, and at the same time in terms of the volume of tourist services in 2015, it took the 2nd place in the Volga Federal District and 8th place in the Russian Federation.

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药物侵袭性再灌注策略的长期结果取决于急性心肌梗死患者ST段抬高时溶栓剂的选择

THE LONG-TERM OUTCOMES OF PHARMACO-INVASIVE REPERFUSION STRATEGY DEPENDING ON THE CHOICE OF THROMBOLYTIC AGENT IN ACUTE MYOCARDIAL INFARCTION PATIENTS PRESENTING WITH ST-SEGMENT ELEVATION

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Relevance. Today, primary percutaneous coronary interventions (PCI) are the strategy of choice in the reperfusion therapy of acute myocardial infarction with ST-segment elevation (AMIeST), provided that an experienced team of x-ray surgeons performed it as soon as possible [1]. However, the vast majority of clinics where patients with AMIeST are hospitalized do not have the possibility of X-ray endovascular interventions, and in those hospitals where this possibility exists, patients often arrive later than the recommended 60-90 minutes after the first ECG [2,3]. In recent years, the pharmaco-invasive treatment strategy for AMIeST has been actively studied, representing the combined use of thrombolysis and PCI and allowing for the acceleration of the onset of reperfusion therapy, increasing its effectiveness, increasing accessibility for the population and, thus, optimizing the provision of assistance with AMIeST [4,5]. However, there is little information

in the literature about the relative effectiveness of fibrin-selective and fibrin-non-selective thrombolytics during pharmaco-invasive reperfusion at AMIeST. Publications about the long-term results of their use in the framework of pharmaco-invasive reperfusion strategy at AMIeST are also presented in a limited form [6, 7].

The purpose of this study was to assess the long-term (one-year) results of the pharmaco-invasive reperfusion strategy for AMIeST, depending on the choice of the thrombolytic drug.

Materials and methods. The open, prospective cohort study included 240 patients with AMIeST after thrombolytic therapy (TLT). Depending on the thrombolytic drug used, all patients were divided into 4 groups: in the 1st group (n = 73), TLT was performed by the drug actilyse; in the 2nd group (n = 40) –metalyse; in the 3rd group (n = 95) –fortelyzin; in the 4th group (n = 32) - streptokinase. To assess the impact on the results of pharmaco-invasive treatment of fibrin-specificity of the used thrombolytic drugs, the results of the study in groups 1, 2 and 3 (fibrin-specific actilyse, metalyse, fortelyzin; n = 208) were summarized and compared with the results of the 4th group (fibrin- non-specific streptokinase; n = 32 individuals). The groups were comparable in pain-needle time (p = 0.324 for groups 1–4), the median value of which with the interquartile range was 160 [110; 230] minutes. PCI after TLT was mandatory for all patients on the day of admission to the hospital. By the nature of the lesion of the coronary arteries and the main parameters of PCI, all groups of patients were comparable. The long-term results of the pharmaco-invasive reperfusion strategy were evaluated 1 year after the onset of AMIeST. The frequency of major adverse cardiovascular events (death from any cause, repeated myocardial infarction, stroke, repeated revascularization of the target vessel, and their combination) was determined. To identify and assess the severity of clinical manifestations of CHF, the scale of assessment of the clinical condition of patients with chronic heart failure (CHF, RSCS) was used, the level of the N-terminal fragment of brain natriuretic peptide (NT-proBNP) was determined. In order to objectify physical performance, a six-minute walk test (SWT) was used. The method of echocardiography (EchoCG) was used to evaluate structural and geometric changes and disorders of the global and local systolic function of the left ventricle. The number of episodes and the total duration of ischemia and arrhythmias, as well as heart rate variability (HRV), were determined using the results of daily monitored ECG (DMECG). All patients were treated with standard drug therapy, including dual disaggregant therapy, beta-blockers, statins, and renin-angiotensin-aldosterone blockers, while in the hospital as well as after discharge.

Statistical analysis of the material was performed using the SPSS software package (version 21.0). Comparative analysis between groups for qualitative traits was performed using Pearson's chi-square test and Fisher's exact test, for quantitative data with a normal distribution, using single-factor analysis of variance and Student's T-test, for quantitative data with asymmetric distribution - using the H-test of Kruskal-Wallis and the criterion of Mann-Whitney.

Results and discussion. According to EchoCG, 1 year after pharmaco-invasive reperfusion of LVEF between groups, there was no statistically significant difference with a tendency to lower values in the streptokinase group (p = 0.420). However, at a comparative assessment between groups, depending on the fibrin-specificity of LVEF drugs was significantly higher when using fibrin-specific thrombolytic drugs compared to fibrin-non-specific streptokinase (49.8 ± 7.4 versus 47.4 ± 6.8, p = 0.048). Similarly, the indicators of local contractility of the LV changed. The values of the regional contractility impairment index (RCII) of the left ventricle also did not significantly differ between groups (p = 0.161) with a tendency to more severe violations of the regional contractility of the left ventricle in the group of streptokinase. At the same time, in the group of fibrin-specific thrombolytic drugs, significantly less impaired regional LV contractility was recorded compared with fibrin-non-selective streptokinase (p = 0.029). In general, no significant signs of LV remodeling 1 year after pharmaco-invasive reperfusion were detected in any group. However, it was found that after the use of fibrin-specific thrombolytics, the values of EDV and EDVi, ESV and ESVi, ESS and ESSi, as well as the LA, remained significantly lower compared to the fibrin-non-specific streptokinase. The use of fibrin-specific drugs showed significantly lower levels of NT-proBNP compared with fibrin-non-specific streptokinase (148 [120; 208] pg/ml vs. 241 [189; 287] pg/ml, p = 0.000), while the concentration of NT-proBNP in the groups actilyze, metalyse and fortelyzin were comparable (p = 0.377).

When assessing the degree of CHF in patients 1 year after pharmaco-invasive reperfusion depending on the fibrin specificity of thrombolytic, it was found that the use of fibrin-specific drugs is characterized by significantly lower CHF manifestations according to RSCS (p = 0.033), as well as a greater distance according to SWT results (p = 0.000) compared with fibrin-non-specific streptokinase. Moreover, with the use of fibrin-specific thrombotic drugs during pharmaco-invasive reperfusion, significantly more patients had 0-1 FC and less than 2-3 FC CHF compared with patients who underwent thrombolysis with streptokinase (p = 0.001).

With DMECG in all groups ischemic episodes were not identified. The incidence of supraventricular paroxysmal tachycardia (SVT) (p = 0.226) and atrial fibrillation (AF) (p = 0.269) was comparable. However, the number of supraventricular extrasystoles was statistically significantly lower in the actilyse group compared with the group of fortelyzin (p1-3 = 0.001), but did not differ between the other groups. It should be noted that the use of fibrin-specific drugs compared with streptokinase was characterized by a significantly lower incidence of SVT (p = 0.049) and a tendency to more rare cases of the development of AF (p = 0.068). The incidence of PVC was also not significantly different between groups (p = 0.130) with a tendency to numerically greater frequency of development of PVC in the group of streptokinase.

Analysis of HRV indices is necessary to identify predictors of ventricular-threatening arrhythmias and sudden death in patients after acute myocardial infarction, as it allows to evaluate the humoral-metabolic and double vegetative regulatory effects on the heart rate, the ratio of sympathetic and parasympathetic influences on the sinus node function. In general, the use of fibrin-specific thrombolytics was characterized by significantly more favorable HRV indicators 1 year after pharmaco-invasive treatment, which indicates a better balance of the vegetative organization of the daily heart rate and a lower risk of developing malignant arrhythmias. It should be noted that the mean values of SDNN, SDNNi, rMSSD and pNN50 in all groups 1 year after pharmaco-invasive treatment corresponded to the age norm.

Within 1 year, the overall mortality in the 1st group was 1.4%, in the 2nd group - 5.0%, in the 3rd group - 3.2%, in the 4th group - 6.3% and not significantly different between groups (p = 0.558). In 1.4% and 2.1% of patients in the actilyse and fortelyzin groups, respectively, repeated MI was recorded. In all cases, it was a type 5 myocardial infarction and was due to coronary artery bypass surgery in these patients. Recurrences/recurrent myocardial infarctions in the metalyse and streptokinase groups were not recorded during the observation period. In our study, the frequency of repeated revascularization of the target vessel for 1 year was 2.7% in the actilyse group, 3.1% in the streptokinase group, and 0% in the metalyse and fortelyzin groups (p = 0.269). In all cases, the cause of re-revascularization of the target vessel was hemodynamically significant restenosis in a previously implanted stent, accompanied by the clinic of angina pectoris. In all patients, the repeated revascularization of IDA was performed using PCI. In 1 (1.1%) case of restenosis in the group of fortelyzin, PCI was not technically possible due to complete obliteration of the stent and the patient was treated conservatively. Thus, during 1 year of follow-up, the incidence of major adverse cardiovascular events, including death, recurrence/recurrent myocardial infarction, any stroke and repeated revascularization of the target artery, was 5.5% in the group of actilyse, 5.0% in the group of metalyse, 5.3% in the group of fortelyzin, 9.4% in the group of streptokinase and was comparable between all four groups (p = 0.836). It is important to note that during the observation period there were no significant differences in the frequency of large adverse cardiovascular events depending on the fibrin specificity of thrombolytic drugs, however, there was a tendency to a smaller number of large adverse cardiovascular events when using fibrin-specific actilyse, metalyse and fortelyzin compared with fibrin-non-specific streptokinase (5.3% vs. 9.4%; OR = 0.56; 95% CI: 0.155-1.989; p = 0.366). A clear tendency towards a smaller number of deaths among patients after discharge from the hospital with the use of fibrin-specific drugs (p = 0.090) attracts attention.

Discussion. In our study, it was demonstrated that the use of a group of fibrin-selective thrombolytic drugs (actilyse, metalyse, fortelyzin) compared with fibrin-non-specific streptokinase in the long-term period was characterized by a significantly higher EF, lower values of RCII LV, EDV, ESV, ESS, LA with a distinct tendency to a smaller CDR according to the results of EchoCG, in addition, a significantly lower frequency of SVT with a tendency to more rare cases

of AF development, as well as a lower frequency and number of PVC against the background of significantly more favorable distribution according to the gradations of the PVC and more favorable HRV indicators according to the results of the DMECG. This fact can be explained by a higher frequency of recanalization of the infarct-dependent artery and restoration of myocardial perfusion, registered in the studied cohort of patients during interventional intervention in the acute period of AMIeST [8]. The results indicate a greater efficacy of modern thrombolytic drugs with fibrin-specificity, and are consistent with the recommendations of the European Association of Cardiologists on the preferred use of fibrin-specific drugs when conducting thrombolytic therapy in patients with AMIeST [1].

It is important to emphasize that, despite significant differences recorded during the study, as well as trends between drugs and drug groups for a number of surrogate endpoints, for hard clinical endpoints, such as death, recurrent myocardial infarction, stroke, re-revascularization of the target artery, all groups of thrombolytic drugs were comparable. It is possible that the evaluation of the results of the study in the longer term will allow already identified significant differences between the groups to transform into clinically significant differences, as, for example, indicates a clear tendency to a lower incidence of deaths within 1 year after discharge from the hospital when used during pharmaco-invasive reperfusion of fibrin-specific thrombolytic drugs ($p = 0.090$). In general, the annual mortality recorded in our study was numerically lower than that observed in multicenter randomized studies.

CHF is the main complication of almost all cardiovascular diseases, therefore, the presence and severity of CHF in the long-term period after myocardial infarction is an important criterion for the effectiveness of reperfusion therapy. In this regard, our results also demonstrated the advantages of pharmaco-invasive reperfusion using fibrin-specific thrombolytic drugs. When using the criteria of the European Society of Cardiology (2016), the frequency of CHF was 73.3% in the first and third groups, 60% in the second, 93.3% in the fourth, numerically more often observed when using streptokinase ($p = 0.209$) and in the overwhelming most were represented by CHF with preserved and moderately reduced LV EF. At the same time, there is a clear tendency towards a greater number of patients with normal levels of NT-proBNP when using fibrin-specific thrombolytics compared with the group of fibrin-non-specific streptokinase ($p = 0.058$).

Findings.

Pharmaco-invasive reperfusion strategy for AMIeST using fibrin-specific thrombolytic drugs, actilyse, metalyse, and fortelyzin compared with the use of fibrin-non-specific streptokinase showed in the long-term more favorable clinical and laboratory-instrumental indicators and did not reveal significant differences between the three studied drugs throughout the observation period. The absence of significant differences between actilyse, metalyse and fortelyzin allows one to make a choice in favor of a particular thrombolytic drug, based on the convenience of its use, taking into account the pharmacoeconomic feasibility.

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在巴什基尔国立医科大学诊所使用网状假体
THE USE OF MESH PROSTHESES IN THE CLINIC
OF THE BASHKIR STATE MEDICAL UNIVERSITY

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注解。 本文介绍了2015年巴什基尔国立医科大学诊所使用网状假体后近似和远处结果的估计值。
关键词: TVT–0, 网状假体, 尿失禁。
Annotation. This article presents an estimate of the approximate and distant results after the use of mesh prostheses at the Clinic of the Bashkir State Medical University for 2015.
Key words: TVT-O, mesh prostheses, urinary incontinence.

Introduction: Stress incontinence of urine today is the most urgent problem at the junction of gynecology and urology due to the increasing number of patients every year. According to studies, the frequency of genital prolapse only varies from 28 to 56.3%. This disease is often found at a young age, tends to progression. About 35% of females over 18 in Europe report episodes of involuntary urine leakage. Currently, the most common surgical method of treating stress incontinence is to install urethral slings on the TVT-O system. This method is the least invasive, has no difficulties in terms of operational techniques and has shown the most productive results [1,2, 3, 4]. However, when using synthetic mesh prostheses, a large percentage of implant-associated complications remain, the most common of which is erosion of the mucous membrane of the vagina with exposure of the prosthetic fragment [5, 6, 7]. Currently, the clinic of the Bashkir State Medical University, under the guidance of Professor at the Department of Obstetrics and Gynecology with the ICPE course Yashchuk A.G. is conducting a study on the

prevention of erosion of the mesh prosthesis on the basis of a study of the immune status at the prehospital stage in females depending on the previous operations.

Purpose: assessment of the results of the use of mesh prostheses in the Clinic of the Bashkir State Medical University (CBS MU).

Materials and methods: A retrospective analysis of 198 case histories of patients with urinary incontinence for 2015 at the CBSMU was conducted. Among these patients an analysis was made of the possible causes of urinary incontinence in terms of indicators that reflect the degree of extragenital pathology, gynecological and reproductive history, the extent and access of surgical interventions. The data obtained as a result of the study were processed using the methods of descriptive and non-parametric statistics using the Statistica computer program for Windows (version 10). Differences were considered statistically significant, for which the probability of error (p) was 0.05 or lower. With the normal nature of the distribution of data, the results are presented as mean ± standard error of the mean (M ± m).

Results and discussions: The average age of the females included in the study was 55.46 ± 9.6 years. In this case, the youngest patient was 29 years old. 135 patients were in menopause. And 63 patients in reproductive age. The study of social factors showed that 43% of patients live in the city, and 52% live in rural areas, of which 87% of women in everyday life experience heavy physical exertion.

In the study of somatic history, it was found that diseases of the cardiovascular system, including hypertension, occurred in 48 (24%) patients. History of angina in 5 females, coronary artery disease in 10 (5%) females. At the same time, chronic heart failure was detected in 10 (5%) females. Iron deficiency anemia was observed in 25 (12.5%) patients, it is worth noting that anemia was found to be mild and moderate in severity. Diabetes mellitus occurred in 11 (5.5%) patients. Varicose disease was diagnosed in 11 (5.5%) females. In our study, one patient showed grade 1 obesity, and grade 2 obesity was detected in 1 female, 5 suffered from grade 3 obesity, and grade 4 obesity had 4 patients. Chronic obstructive pulmonary disease was diagnosed in one female. Kidney disease was detected in two patients.

The menarche was 13.4 ± 1.99 years old, and the sexual debut of the patients studied was 17.8 ± 2.6 years. The number of pregnancies varied from 0 to 21 and averaged 5.41 ± 3.33, with an average of 2.24 ± 0.8 births per patient. However, the study involved patients who had a history of pregnancy and childbirth. Of these, 34.1% of pregnancies ended in vaginal delivery, 4.6% by cesarean delivery, 56.7% by medical abortions, and 4.6% of miscarriages ended in spontaneous abortions.

The gynecological history was studied in detail in the patients included in the study. It is noteworthy that a quarter of patients have been diagnosed with uterine fibroids. Adenomyosis was detected in 11 (5.5%) patients. Vulvar leukoplakia was observed in two females. 5 patients at the time of inspection had intrauterine

device installed. Ovarian cyst was observed in 12 patients. We studied which gynecological operations were carried out earlier: 19 females had a history of extirpation of the uterus, a conservative myomectomy with a history of two females, plastic surgery of the vagina was performed in two patients, ovarian resection (laparoscopy) to 3 females.

The main complaints at admission were urinary incontinence when sneezing, physical exertion, foreign body sensation in the vaginal area and perineum. At the same time, genital prolapse was observed in almost all patients. POP-Q II was detected in 168 patients, POP-Q III in 8 females, POP-Q IV in 4 patients. However, it is worth noting that in 20 patients prolapse of the genitals is absent. The average duration of urinary incontinence complaints is 5.58 ± 4.07 years. Despite the wide spread of this disease, only 4-6.2% of females seek medical care in our country, compared with 30% in developed countries [Loran, 2006]. Under the leadership of Professor Yaschuk A.G. the department staff conducts preventive work with females in connection with which there is an increase in the number of patients with this pathology.

All patients underwent surgical treatment with TVT-O. However, there were also combined operations such as: transvaginal extirpation of the uterus was performed on one patient, fixation of the stump to the aponeurosis of two females, fixation of the cervical stump to the promontorium carried out in three patients, plastic surgery of the vagina with pelvic floor muscle reconstruction in 174 patients, Manchester surgery performed 4 patients, so for two females with no sex life a median colporrhaphy had been held. Since there were patients who did not have pregnancies and births in the history, it is worth noting that we used mesh prostheses only if females did not plan a future pregnancy. Since there was experience of using mesh prostheses in three females who later had childbirth, after which urine leakage was noted.

The average blood loss during the operation was 89.1 ± 40.5 ml. The average duration of the operation is 51.2 ± 15.6 min. The average length of stay was 6.1 ± 1 days. We have found that predictors of urinary incontinence are the age of patients, the number of births through the birth canal, the number of pregnancies, the duration of menopause. However, further analysis of predictors of urinary incontinence in women of reproductive age will be carried out on the basis of accumulated experience.

In the postoperative period, changes from clinical and laboratory studies were within the normal range, except for increasing the level of ESR. The average level of ESR was 21 ± 8.9 mm/h. In this regard, we wondered if there is an immunological response of the body to the use of mesh prostheses. In the future, this issue will be studied in more detail. Long-term results showed that adverse events in the form of erosion of the mesh prosthesis were detected in 8 patients and one patient had a urethro-vaginal fistula.

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创伤性下颌骨·骨髓炎合并慢性应激患者术后病程
THE COURSE OF POSTOPERATIVE PERIOD IN PATIENTS WITH POSTTRAUMATIC MANDIBULAR OSTEOMYELITIS IN THE BACKGROUND OF CHRONIC STRESS

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注解。 在这项工作中，作者分析了术后期间慢性应激背景下创伤后骨髓炎患者的临床表现。
关键词：创伤后骨髓炎，下颌，切除术，慢性应激。

Annotation. *In this work, the authors analyzed the clinical manifestations in patients with post-traumatic osteomyelitis in the postoperative period against the background of chronic stress.*

Keywords*: posttraumatic osteomyelitis, lower jaw, sequestrectomy, chronic stress.*

Despite the constant improvement of facial bones fractures treatment, the incidence of adverse outcomes and complications remains quite high. On the one hand, this is due to the significant frequency of fractures and complications during surgical treatment, on the other hand, the pathomorphism of the disease is associated with environmental factors and social conditions.

The most frequent complication in the jaw bones fractures treatment is the development of chronic post-traumatic osteomyelitis. Patients with this pathology account for 10–25% of all patients in specialized maxillofacial hospitals (4). In addition, in recent years, the number of patients with this pathology has increased, and the inflammatory process severity has worsened (1,2,3). Most authors note the predominant disease of jaw post-traumatic osteomyelitis of persons aged 20 to 40 years, more often than others. The defeat of mandibula is much more common than maxilla.

Osteomyelitis of the jaw develops when the general anti-infective nonspecific and specific immunity decreases and disturbs, often against the background of primary or secondary immunological deficiency as manifestations of changes in the general state of the body, including those caused by impaired homeostasis maintenance systems. General immunological reactivity, long-term exposure of the infected foci on the body affect local defense reactions and, directly, the various components of the oral fluid, tissue and vascular structures of the bone marrow. Due to a combination of these factors, it seems logical to increase the frequency of purulent-inflammatory complications on the background of traumatic bone fractures, the repair of which occurs under conditions of ischemia and disorders of tissue respiration.

Also, in addition to the complications of facial bones fractures, attention is drawn to the duration of its standard therapy. Due to the absence of differences in patients by sex and age and comorbidity, there is a reason to believe that the cause of the features revealed is a prolonged stress response.

The aim of the work was a comparative analysis of the clinical manifestations in the postoperative period of patients with posttraumatic osteomyelitis against the background of chronic stress.

In accordance with the goal, 46 patients aged from 35 to 61 years were examined with a diagnosis of chronic posttraumatic mandibular osteomyelitis. Of these, 20 patients (group 2) from among the internally displaced persons from the territories of military conflicts.

In the treatment of chronic post-traumatic osteomyelitis of the jaw, surgical treatment included sequestrectomy, washing the pathological focus with antiseptic solutions and filling it with osteoplastic material. Also, patients underwent medical anti-inflammatory treatment: antibiotics, desensitizing and general strengthening therapy, physiotherapy.

The criteria for the effectiveness of chronic post-traumatic osteomyelitis treatment were: the absence of clinical and radiological signs of the inflammatory process, the disappearance of osteomyelitis signs in local of caused by complaints and physical methods of examination. In addition, not only the immediate effect of the treatment was taken into account, but also the frequency of the resulting complications. Only with the combination of these criteria could it be concluded that the surgical treatment was effective.

In the first three days after surgery, we evaluated the timing of registration of the most dynamic local and general clinical signs of inflammation - edema, pain, temperature response, the nature of wound healing.

A comparative assessment of the dynamics of the regression of edema in the postoperative period in patients with chronic post-traumatic osteomyelitis showed that there is a more rapid decrease in edema in the first group of patients. At the

same time, significant changes were noted from the first days of the postoperative period.

When comparing the duration and severity of pain syndrome, there were no significant differences between the groups. In all groups of patients, the pain syndrome regressed within 7 days, and its severity was comparable.

When assessing the dynamics of regression of the temperature response, there was a tendency to an earlier normalization of body temperature in patients of the first group. Normalization of body temperature was noted by the 3rd day of postoperative treatment, while in the group with stress exposure was recorded up to 7 days.

Analyzing the results of surgical treatment of patients with chronic post-traumatic osteomyelitis, it was found that the average duration of inpatient treatment of patients in the first group was 9 ± 1.6, in the 2nd - 14 ± 2.2. It should be noted that three patients in the second group required repeated surgical intervention in the form of rehabilitation and drainage of the postoperative wound. Thus, the data obtained indicate that the course of post-traumatic osteomyelitis of the mandible in individuals exposed to prolonged stressful effects tends to prolongation, which in turn requires medical correction.

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下颌骨骨折后慢性酒精中毒背景下骨组织再生活动的研究
STUDY OF REGENERATIVE ACTIVITY OF BONE TISSUE AFTER MANDIBULAR FRACTURES AGAINST BACKGROUND OF CHRONIC ALCOHOL INTOXICATION IN THE EXPERIMENT

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注解。 在关于酒精中毒模型的实验中，在白色Wistar大鼠中，在通过teturam抑制醛脱氢酶的条件下研究骨组织再生。 与主动和被动对照相比，揭示了酒精化动物的再生活动的抑制。
关键词：骨组织再生，酒精中毒。
Annotation. *In an experiment on a model of alcohol intoxication, bone tissue regeneration was studied in white Wistar rats, under conditions of inhibition of aldehyde dehydrogenase by teturam. The depression of regenerative activity in alcoholized animals was revealed in comparison with active and passive control.*
Key words*: bone tissue regeneration, alcohol intoxication.*

Among the numerous problems encountered in patients with traumatic injuries of the bones of the facial skeleton, a special place is occupied by issues related to the regeneration of bone tissue, especially among those who abuse alcohol. As is know, one of the metabolic effects of ethanol is an increase in lipid peroxidation against the background of suppression of the antioxidant system of the cell. At the same time, it is necessary to take into account that damage to the bones entails a violation of microcirculation and the development of bone ischemia, which creates unfavorable conditions for reparative regeneration of bone tissue. Thus, in case of a traumatic fracture of the jaw bones in persons with pernicious alcohol abuse, we have a combination of two factors unfavorable for the formation of callus and its subsequent restructuring, which affects the timing of consolidating. As is known, ethanol violates the regenerative activity of bone tissue (3). Due to the large number of such patients and their hospitalization (1,2), this problem is, in our opinion, relevant, requiring

complex, including experimental study. As is known, with each repeated introduction of ethanol, metabolic disturbances are aggravated, the most reliable in terms of extrapolation is an experiment with the state of alcohol-metabolizing system links characteristic of chronic alcohol intoxication in humans. As a drug that is potentially capable of correcting disorders in the energy exchange system in the face of declining microcirculation and tissue hypoxia, acizol attracts attention, which improves oxygen delivery and reduces the body's need for oxygen. Materials and research methods. An experimental study was conducted on 120 Wistar white rats weighing 180–200 g. To reproduce alcohol intoxication, a test group of animals intragastrically administered a 48% ethanol solution at a dose of 4.2 mg / kg daily and a teturam suspension of 48% alcohol at a dose of 25 mg / kg body weight once every four days.

The control group of animals was intragastrically injected with teturam suspension of in tap water in the same dosage and in terms of a similar duration as in experimental animals (active control). There was also a group of 30 animals that did not administer any solutions and suspensions.

Animals of the experimental and control groups under ether anesthesia were excised the femur section of 5 mm long to half of bone diameter. The edges of the soft tissue incision were matched with angular seams. Since the infectious-inflammatory process is more common with mandibular bone fractures in the clinic. Animals were removed from the experiment at 3, 6, 20 and 45 day to studydynamics of regenerative processes in the bone tissue . The bone defect area was cut out, decalcified, followed by paraffin filling and preparation of 3 μm thick slices. Sections were stained with hematoxylin and eosin and according to Van Gieson.

Results and discussion. Comparative analysis of reparative processes in the area of the formed femur defect in experimental animals shows that during alcohol intoxication, the formation of bone replacement tissue in all cases micro- and macroscopically proceeded more slowly than in animals of the active and passive control groups. So, macroscopically, in animals of the control group, on the 3rd day, the area of the defect was covered with granulations, the hematoma completely regressed and was not determined by the unarmed eye.

Granulations in the group with alcohol intoxication were much less pronounced, in some animals, small areas of the remaining hematoma were visually identified. The area of bone defect in animals treated with teturam did not differ from passive control animals. After 6 days, the animals of the control group formed a callus above the surface of a bone of rather dense consistency in alcoholized animals.

Callus was a soft-elastic consistency, grayish in color. The control was reddish in all cases. On the 20th day after the formation of the defect in the control animals and in most cases, the "alcoholized" callus had the same appearance, but on the 45th day in the control, the callus was bone-like and significantly decreased in size, in most cases weakly protruding above the bone surface. The histological picture of regenerating tissue also makes it possible to judge the lag in the defect repair in an experimental group of animals.

In the preparations obtained from the site of damage in animals of the control group on day 3, the prevalence of inflammatory elements of the granulating tissue over the cellular ones was noted along the periphery with single groups of chondro and osteoblasts. In these animals, a large number of macrophages were present during these periods, there were fragments of necrotic bone. When stained by Van Gieson, individual bundles of thin collagen fibers without a clear orientation were determined. On the 6th day, chondroblasts prevailed among the large amount of fibrous tissue in the animals of the control group. In the experimental group, regenerating tissue was represented mainly by fibers and the vascular component, the number of cells in proliferating bone tissue was lower compared to the control. In preparations obtained from animals withdrawn from the experiment in 20 days after the traumatic exposure, signs of weaker regenerative activity were detected, which were poorly determined macroscopically.

In the control group, in a large volume of fully formed cartilage callus, there were areas of developing bone tissue with trabeculae, the number of which in animals undergoing alcoholization was significantly lower. 45 days after the start of the experiment, the animals of the control group showed inflammation of bone architectonics, which had well-developed trabeculae and formed haversian system in most of the animals.

In the experimental group, most of the preparations contained bone tissue with trabeculae of different directions and different thicknesses, which were in different phases of resorption. Thus, according to the data, larger differences in the rates of tissue structures formation characteristic of reparative osteogenesis correspond to different healing times.

Conclusions:

1. Alcohol intoxication under conditions of inhibition of aldehyde dehydrogenase reduces the regenerative activity of bone tissue.

2. The most likely mechanism of slowing the rate of bone regeneration when exposed to ethanol is a violation of the proliferation of the cambial elements of osteogenic tissue.

3. For a corrective effect on alcohol-induced impairment of reparative osteogenesis, it is possible to recommend drugs that improve the delivery of oxygen to the tissues.

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评估特发性不育男性的促炎介质的局部产生
EVALUATION OF LOCAL PRODUCTION OF PROINFLAMMATORY MEDIATORS IN MEN WITH IDIOPATHIC FORM OF INFERTILITY

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抽象。为了评估促炎介质的局部产生，对55名患有特发性男性不育症的男性进行了精浆研究。受试者被分为三组，这取决于精子染色质结构组织的违反（精子染色质的压实 – D / s和缺陷细胞的数量 – HDS）。

第1组 – 17名患者，精子染色质程度（D / s）和精浆中缺陷细胞（HDS）的压缩均在常规范围内（D / s> 48.5使用单位，HDS <15.0%）。

第2组 – 19名患者，其中一项指标在既定标准范围内，而另一项指标不符合标准值（D / s> 48.5使用单位和HDS> 15.0%或D / s <48.5常规单位和HDS < 15.0%）。第3组 – 19名患者射精D / s染色质紧密度和有缺陷的HDS细胞数量不符合既定标准（D / s <48.5使用单位；HDS> 15.0%）和第4组--15名健康男性生育功能正常的育龄期。

研究表明，精子结构组织参数的恶化，以及随后偏离精子指标的标准，都是在地方一级发生一系列促炎反应的背景下发生的。确定循环促炎和抗炎介质的水平：在评估特定类型的男性不育症时，应使用精浆中的IL-1β, TNF-α, IL-8, IL-10, CRP和TGF-β1。

关键词: 特发性男性不育症, 精子染色质紧实, 细胞因子。

Abstract. In order to assess the local production of proinflammatory mediators, a study of seminal plasma in 55 men with idiopathic male infertility was conducted. The subjects were divided into three groups, depending on the violation of the sperm chromatin structural organization (compaction of sperm chromatin - D / s and the number of defective cells - HDS).

Group 1 - 17 patients in whom the compaction of sperm chromatin degree (D / s) and the number of defective cells (HDS) in seminal plasma were within the conventional norm (D / s> 48.5 used units, HDS < 15.0%).

Group 2 - 19 patients in which one of the indicators is within the established norm, while the other does not meet the standard value (D / s> 48.5 used units and HDS> 15.0% or D / s <48.5 conventional units and HDS <15.0%). Group 3 - 19 patients in whose ejaculate the D / s chromatin compaction degree and the number of defective HDS cells do not meet the established standards (D / s <48.5 used units; HDS> 15.0%) and 4th group - 15 healthy men of fertile age with normal reproductive function.

It was shown that the deterioration of spermatozoa structural organization parameters, and subsequently deviation from the norm of spermogram indicators, occurs against the background of the launch of a cascade of pro-inflammatory reactions at the local level. Determining the level of circulating pro-and anti-inflammatory mediators: IL-1β, TNF-α, IL-8, IL-10, CRP and TGF-β1, in seminal plasma, should be used when evaluating specific types of male infertility.

Keywords: *idiopathic male infertility, sperm chromatin compaction, cytokines.*

Relevance. The demographic situation associated with low fertility and "zero" population growth is recognized as one of the key problems of modern society. From a medical standpoint the problem of reproductive health deterioration becomes essential. The prevalence of infertile marriage in some regions of Russia exceeds critical level and ranges from 8 to 19.6% [1]. According to the literature, about 30% of problems with conception in a married couples are due only to the male factor, about 20% of cases show disturbances in the reproductive system, both in man and woman, therefore, in the structure of infertile marriage in half of cases the role of the male factor [2, 3]. This situation is aggravated by the fact that impaired reproductive health of men - potential fathers, as a rule, remains without proper attention, In addition, there are no clear criteria for diagnosis, correction, prevention of male reproductive disorders.

The conventional integral criterion of male reproductive function state is the analysis of seminal plasma, which includes the assessment of concentration, mobility and morphology of the spermatozoa. The results tests recommended by WHO are not always reliable since fertility is maintained even with significant deviations of spermogram indices from the norm, while infertility can also be observed in men with normospermia [4,5].

Currently, one of the most promising areas in the field of male reproductive disorders is the study of male gametes chromatin structural anomalies, which may be due to endogenous molecule breaks in the of sperm nuclei chromatin compaction process, the initiation of apoptosis during spermatogenesis, oxidative stress as a result of excessive concentrations of reactive oxygen species [6, 7].

The regulation of male reproductive function is multi-level, involving not only the endocrine, but also other systems, in particular the immune system. The nor-

mal course of gametogenesis is provided by the interaction of numerous cells of various types, which are carried out not only by direct intercellular contacts, but also due to a complex system of cytokines [8, 9].

Despite the existing opinion about the important part of cytokines in human reproductive physiology, the clinical significance of cytokines determination in sperm plasma for the male infertility diagnosis and the assessment of spermatozoa fertilization potential remains controversial. It is believed that cytokine analysis does not provide additional information when examining infertile men, since a change in cytokine level in seminal plasma is not associated with the effectiveness of spermatogenesis, but mainly with the infectious inflammatory process in the male reproductive tract [10].

Objective: to evaluate the local production of proinflammatory mediators in men with idiopathic infertility.

A study of the ejaculate in 55 men with idiopathic male infertility. Exclusion criteria: female factor of infertility, hormonal disorders, viral-bacterial infections and abnormal spermogram indicators verified during examination of a married couple.

When studying the structural organization of sperm chromatin among patients with idiopathic infertility, the parameter values fluctuated: the index of sperm chromatin compaction degree varied (D / s ranged from 12.68 used units to 79.44 conventional units), and the value of the HDS parameter (percentage of defective cells) ranged from 6.59% to 85.32%.

The heterogeneity of research results allowed us to distinguish three groups. The selection criterion was the degree of sperm chromatin compactization (D / s) and the number of defective cells (HDS) characterizing the organization of male germ cells (Table 1).

Table 1

Indicators of the sperm structural organization in men from couples with infertility and normospermia (M ± σ)

Indicators	Men from infertile couples with normospermia, (n=55)		
	1st group (n = 17)	2nd group (n = 19)	3rd group (n = 19)
D/s, conv.un.	58,21 ± 9,89	46,51 ± 12,62*#	32,16 ± 11,58*
HDS,%	13,4 ± 1,92	23,64 ± 11,21*#	53,33 ± 27,35*

*Note: * p <0.01 - statistically significant differences with the 1st group, # p <0.01 - between the 2nd and 3rd groups.*

Group 1 - 17 patients in whom the compaction of sperm chromatin degree (D / s) and the number of defective cells (HDS) in seminal plasma were within the conventional norm (D / s> 48.5 used units, HDS < 15.0%).

Group 2 - 19 patients in which one of the indicators is within the established norm, while the other does not meet the standard value (D / s> 48.5 used units and HDS> 15.0%) or (D / s <48.5 conventional units and HDS <15.0%). Group 3 - 19 patients in whose ejaculate the D / s chromatin compaction degree and the number of defective HDS cells do not meet the established standards (D / s <48.5 used units; HDS> 15.0%) and 4th group - 15 healthy men of fertile age with normal reproductive function.

The study was approved by the local ethical committee of the FSBI "Research Institute of OMM" of the Ministry of Health of Russia, from all patients received informed consent to the use of biological material for scientific purposes.

The structure of spermatozoa chromatin was assessed using flow cytofluorimetry on a FACSCalibur analyzer from Becton Dickinson (USA). The SCSA method (Sperm Chromatin Structure Assay) was used in our modification [11].

The levels of IL-1β, IL-8, and transforming growth factor-beta (TGF-β) in seminal plasma were determined using test systems from the company BIO-SOURCE (USA), the content of TNF-α using reagents CYTIMMUNE (USA), C-reactive protein (CRP) -, manufacturer BIOMERICA, Germany.

Results. Studies have shown that all patients with idiopathic male infertility showed an increase in the concentration of IL-1β, TNF-α and IL-8, which levels were significantly higher than that of healthy fertile men (Table 1). Enhanced production of proinflammatory cytokines as indicators of immunocompetent cells functional activity contributed to a further increase in the synthesis of secondary mediators (CRP).

The level of CRP increased only in patients of the 3rd group with a high content of defective cells in the seminal plasma and reduced compaction of spermatozoa chromatin, which indicates the development of oxidative stress and free radicals formation, the excess concentration of which is considered to be the source of the sperm DNA breaks.

Table 2

The content of cytokines in the sperm plasma in men with idiopathic infertility ($M \pm \sigma$)

Indicators	1st group, (n=17)	2nd group, (n=19)	3rd group, (n=19)	4th group (healthy men), n=15	Significance level (p)
IL-1β, pg/ml.	4,7 ± 2,29	2,69 ± 0,89	3,35 ± 0,57	2,14 ± 0,03	$P_{1-4, 2-4, 3-4}$ =0,0001
TNF-α, pg/ml.	35,29±2,21	37,54 ± 7,30	36,30±5,1	32,04 ± 1,93	P_{1-4} =0,0001 P_{2-4} =0,008 P_{3-4} =0,004
IL-8, pg/ml.	269,03±255,9	232,4±210,9	383,3±290,2	40,6 ± 1,91	P_{1-4} =0,002 P_{2-4} =0,001 P_{3-4} =0,0001
CRP, ng/L	0,26 ± 0,01	0,33 ±0,04	0,39±0,03*	0,25 ± 0,19	P_{3-4} =0,003
IL-4, pg/ml.	3,27 ± 0,74	4,05 ± 1,58	4,12 ± 1,57	3,14 ± 0,37	P_{2-4} =0,037 P_{3-4} =0,025
IL-10, pg/ml.	2,6 ± 0,21	2,96 ± 1,09	5,94±2,35	2,21 ± 0,09	P_{1-4} =0,0001 P_{2-4} =0,012 P_{3-4} =0,0001
TGF-β, pg/ml.	11249 ± 727	12955 ± 2565	23163 ± 1000	12380 ± 314	P_{3-4} =0,0001

In response to the increased concentration of inflammatory mediators in patients of the 1st, 2nd and 3rd groups, an increase in IL-10 production was noted. Elevated levels of IL-4 in seminal plasma were recorded only in men with impaired structural organization of spermatozoa chromatin (deviation from the norm of one or two indicators - D / s or HDS). It should be noted a significant increase in the content of TGF-β in the seminal plasma in men with deviations from the norm of D / s and HDS, the level of which was 1.9 times higher than the comparison group.

The identified positive correlations between the degree of chromatin compaction with the level of TGF-β, IL-4, IL-10 ($r = 0.84$, $r = 0.75$, $r = 0.70$, respectively, with $p < 0.0001$), and IL-4 with the number of defective cells in seminal plasma ($r = 0.84$, $p < 0.0001$) in men of the 3rd group indirectly confirms the involvement of regulatory mediators in the violation of the structural organization of sperm chromatin.

Conclusion. Thus, a number of cytokines are involved in immunological events accompanying the process of spermatogenesis. The deterioration of spermatozoa structural organization parameters and the subsequent deviation from the norm of spermogram indicators occurs against a cascade of pro-inflammatory reactions at the local level. The determining the level of circulating pro-and anti-inflammatory mediators: IL-1β, TNF-α, IL-8, IL-10, CRP and TGF-β1 in seminal plasma should be used when evaluating the specific types of male infertility.

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检查类似于AB0血型系统的抗原，微生物表面和食品细胞悬浮液中抗原决定簇的存在

EXAMINATION OF THE PRESENCE OF ANTIGENIC DETERMINANTS SIMILAR TO THE ANTIGENS OF THE AB0 BLOOD GROUP SYSTEM, ON THE SURFACE OF MICROORGANISMS AND IN CELL SUSPENSIONS FROM FOOD PRODUCTS

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抽象。关于AB0系统的抗红细胞抗A和抗B抗体的起源仍然没有达成共识。有两种观点，根据这一观点，一方面，它们在出生后立即出现在所有人中而没有事先免疫，另一方面，它们的形成发生在免疫细胞与微生物表面上的抗原相互作用之后。与食品组合物中的抗原决定簇有关。

使用在微生物表面和食品的细胞悬浮液中含有单克隆抗红细胞抗A和抗B抗体的菌落克隆测定与人红细胞A和B抗原相似的抗原决定簇。检测到由具有抗红细胞抗A和抗B抗体的食物制备的各个微生物和细胞悬浮液之间的阳性凝集反应。按以下顺序记录定量阳性结果：植物来源产品的最大值，动物较少，发酵乳产品中最小值。

关键词：AB0系统血型，旋风分子，单克隆抗体。

Abstract. There is still no consensus about the origin of anti-erythrocyte anti-A and anti-B antibodies of the AB0 system. There are two points of view, according to which, on the one hand, they are detected in all people immediately after birth without prior immunization, on the other hand that their synthesis occurs after the interaction of immune cells with antigens of the microorganisms cell surface and with antigenic determinants in the food composition.

Antigenic determinants on the surface of microorganisms and in cell suspensions from food similar to human erythrocyte antigens A and B were

determined using the "Coliclon AntiA" IgM reagent kits (Coliclone) for human blood erythrocytes determination containing monoclonal anti-erythrocyte anti-A and anti-B-antibodies. A positive agglutination reaction between individual microorganisms and cell suspensions prepared from food with anti-erythrocyte anti-A and anti-B antibodies was detected. Quantitatively positive findings were recorded in the following range: the maximum for products of plant origin, less for the animal and the minimum among fermented milk products.

Key words: blood groups of the AB0 system, coliclones, monoclonal antibodies.

The study of the AB0 blood groups continues to the present. The erythrocytes antigenic structure is quite studied, as well as antibodies. However, their origin is explained in different ways. Previously, anti-erythrocyte anti-A and anti-B antibodies in the literature were called natural, it was believed that they appear immediately after birth [4, 6].

Another point of view on the formation of antibodies explains their appearance by the interaction of human immune system with antigens, located on the outer surface of microorganism cell or with antigenic determinants in the food composition [1, 2, 3]. In that case the constantly high titer of anti-A and anti-B antibodies may be explained, since the antigenic stimuli are constant throughout life. According to this view, it is believed that the formation of antibodies in the human body begins after birth, so the newborns do not have them, and the maximum production is reached at the age of 8–10 years [3] or 5–10 years [5].

The aim of the study is to identify antigenic determinants similar to human erythrocyte antigens A and B on the surface of microorganisms and in cell suspensions from food products

Materials and research method.

Research materials: microorganisms, cell suspensions from food.

Research method: Agglutination reaction on glass with anti-A and anti-B reagents (manufactured by "Hematolog LLC", Russia), containing monoclonal antibodies to antigens A and B of the AB0 blood groups.

The agglutination reaction of microorganisms with coliclones was carried out according to the instructions for the human erythrocyte antigens A and B determination: a drop of coliclones and a drop of a bacterial suspension or a suspension of cells from food in a 0.9% sodium chloride solution were applied to the glass. The drops were mixed using disposable tips automatic dispenser. The results of the reaction were taken into account after 5-10 minutes after shaking the glass.

In total, two groups of experimental samples were taken in the experiment: microorganisms and food products.

The first group included 72 microorganism cultures, which were divided into five subgroups according to the method of obtaining the material:

1. Strains obtained from the national type culture collection (NCTC) (n=4): *Enterococcus faecalis, Klebsiella pneumoniae, Staphylococcus aureus, Staphylococcus epidermidis.*

2. Strains isolated from clinical material (n = 5):*Salmonella enteritidis, Staphylococcus aureus, Klebsiella pneumoniae, Escherichia coli, Pseudomonas aeruginosa.*

3. Cultures obtained by washes from hands (n=27).

4. Cultures isolated from air (n=35).

5. Baker's yeast (n=1).

Microorganisms from the national collection of type cultures and from clinical material were presented from museum cultures and from the clinical bacteriological laboratory, where they were identified. The microorganisms of the two other subgroups were prepared independently according to the classical method of obtaining washes from hands and sowing from air, which were cultivated on nutrient media, and then their morphology (mushrooms, cocci or bacilli) and tinctorial properties (gram-positive or gram-negative) were determined.
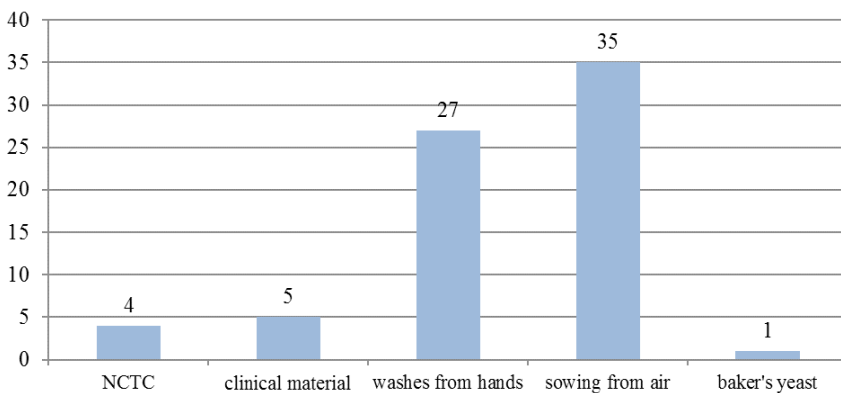

Fig. 1. The number of microorganisms by the obtaining source.

Food products (n = 45) were divided into subgroups:

- animal origin (n = 9: mutton, beef kidney, beef liver, chicken liver, chicken heart, chicken stomach, muscle tissues of beef, chicken and pig);

- dairy (n = 9: varenets, kefir, milk, ryazhenka, sour cream, "Snowflake", "Russian" cheese, Adyghe cheese, cottage cheese);

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- vegetale - (n=33), green peas, broccoli, potatoes, carrots, cucumber, sweet red pepper, tomato, onion, green beans, apricot, orange, banana, pear, red plum, apple, black grape, cherry, sea buckthorn, currant, peanut, brazil nut, walnut , cashews, almonds, hazelnuts, apricot kernels, buckwheat, semolina, oatmeal, barley, millet, rice groats, flour).
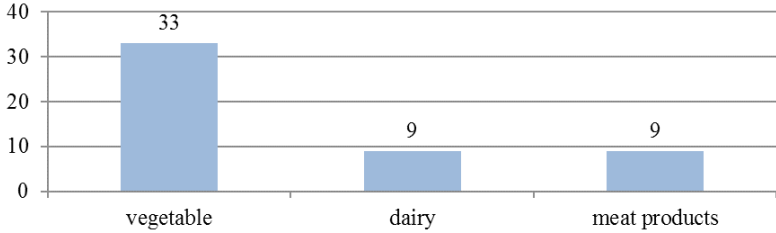

Fig. 2. Distribution of food products by origin.

The results of the study.

In the study of microorganisms obtained from the national type culture collection - NCTC - one positive agglutination reaction was observed in *Staphylococcus epidermidis* with both types of monoclonal antibodies. *Enterococcus faecalis*, *Klebsiella pneumoniae*, *Staphylococcus aureus* had no such reaction.

The bacteria representatives of the second subgroup isolated from clinical material showed a positive agglutination reaction of *Escherichia coli* with anti-B monoclonal antibodies, whereas *Staphylococcus aureus* gave a positive reaction simultaneously with two types of coliclones (Fig. 3).

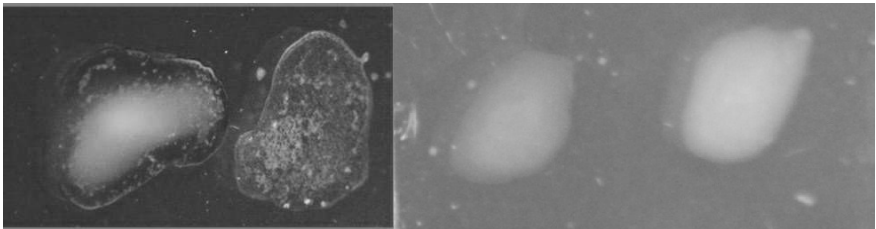**Fig. 3.** The left photograph shows the positive agglutination reaction of *Staphylococcus aureus* from clinical material with anti-A (left) and anti-B (right) coliclones, and the right one is the result of negative agglutination reaction of *Pseudomonas aeruginosa* from clinical material with two types of monoclonal antibodies.

The third group of microorganisms obtained by hand washes was represented

by gram-positive cocci (n = 12), gram-positive bacilli (n = 9), and mixed culture (n = 5), which gave the following results: a positive agglutination test was observed with only one representative from each subgroup and simultaneously with both types of antibodies. Only one colony was represented by gram-negative cocci and with it a positive agglutination reaction was not observed.

The most numerous group of microorganisms is represented by bacteria isolated from air (n = 35), most of them are gram-positive cocci (n = 29). The results of the study revealed a positive agglutination test in one representative with only anti-A antibodies, in two with only anti-B antibodies, and one simultaneously with two types of antibodies. Among gram-positive bacilli (n = 2) and gram-negative cocci (n = 2), there was no reaction with the coliclones, but a positive reaction was observed between gram-positive fungi (n = 2) and anti-B antibodies.

Baker's yeast showed positive agglutination test with anti-A and anti-B antibodies.

The results of the study of 36 samples of plant products, are presented in table 1.

Table 1.

The results of the agglutination reaction between food and anti-A and anti-B coliclones

Foods of plant origin					
Apricot	+	Broccoli	+	Pearl barley	+
Orange	+	Potato	+	Tomato	+
Peanut	+	Cashew	-	Sweet red pepper	+
Banana	+	Semolina	+	Millet groats	-
Brazilian nut	-	Almond	-	Rice cereal	-
Grape black	+	Carrot	+	Red plum	+
Cherry	+	Flour	-	Currant	+
Walnut	+	Sea buckthorn	+	Green beans	+
Buckwheat	+	Oat groats	-	Hazelnut	-
Pear	+	Cucumber	+	Apple	+
Green peas	+	Onion	+	Apricot kernel	-
Dairy food			Foods of animal origin		
Varenetz		+	Mutton		-
Kefir		-	Beef kidneys		+
Milk		-	Beef liver		+
Ryazhenka		-	Chicken liver		-
Sour cream		+	Chicken heart		-
"Snowflake"		-	Chicken stomach		-
Cheese «Russian»		-	Beef muscle tissue		-
Adyghe cheese		+	Chicken Muscle Tissue		-
Cottage cheese		-	Pig muscle tissue		-

Among the experimental samples obtained from the first subgroup of food products, in 24 cases with both anti-A and anti-B monoclonal antibodies, a positive agglutination reaction was noted.

It should be noted that the samples subjected to prolonged freezing also gave a positive reaction with the coliclones (from cherry, sea buckthorn, green peas, mushrooms, currants, broccoli). Samples after exposure to high temperatures (cooking conditions) were also able to form an antigen-antibody complex with monoclonal antibodies (from potatoes).

In the subgroup of dairy food products, a positive agglutination reaction with anti-A and anti-B monoclonal antibodies was observed simultaneously with sour cream, varenetz and Adygei cheese. With milk, kefir, ryazhenka, cottage cheese, "Russian" cheese and "Snowflake", the agglutination reaction was negative.

The results obtained within this subgroup can presumably be associated with the antigenic characteristics of microorganisms that are used in the food industry for the preparation of a particular type of product.

A suspension of animal cells gave a positive result with both types of monoclonal antibodies with only beef kidney and liver samples.
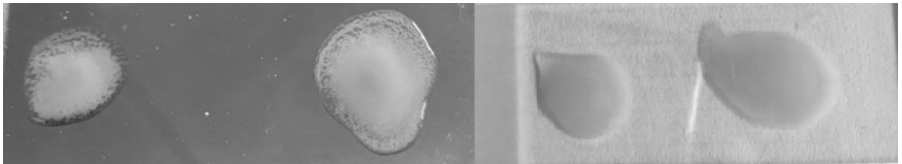

Fig. 4. On the left is a photograph of a positive agglutination test of a sample prepared from cherries with anti-A and anti-B monoclonal antibodies (left and right, respectively). The right photo shows the result of a negative agglutination test of a sample prepared from rice cereals with anti-A and Anti-B coliclones.

Conclusion.

The results of the study showed that a positive agglutination reaction occurs between individual microorganisms and anti-A and anti-B antibodies of human erythrocytes. However, different isolates of the same representatives, for example, *Staphylococcus aureus*, do not give stable results. The strain of the national collection of type cultures does not react with antibodies, and isolated from clinical material is agglutinated simultaneously by both types of antibodies.

Products of plant origin showed the presence of antigenic determinants similar to the human erythrocytes antigens A and B in larger amounts. In smaller quantities, these antigenic determinants were found out in food samples of animal origin and fermented dairy products. Moreover, prolonged heat treatment (the action of high or low temperatures) did not affect the results of the reaction.

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甲状腺激素对缺血性卒中严重程度和预后的影响：预测价值和进一步研究方向的选择

EFFECTS OF THYROID HORMONES ON THE SEVERITY AND OUTCOME OF THE ISCHEMIC STROKE: PREDICTIVE VALUE AND CHOICE OF DIRECTIONS FOR FURTHER RESEARCH

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抽象。背景。根据最近的研究，甲状腺激素可能对卒中的严重程度，病程和结果产生各种影响。

目的。目的是确定临床研究中甲状腺激素与卒中严重程度的关系。

方法。在这项研究中，招募了168名成人急性缺血性卒中患者。在症状出现24小时期间评估游离T3（fT3），游离T4（fT4），TSH和基本卒中危险因素的浓度。通过斯堪的纳维亚卒中量表（SSS）评估神经功能缺损。禁用缺陷定义为中风后6个月mRs评分≥3。

结果。 ANOVA显示，第4个四分位数（≥5.35pmol／1）的fT3水平患者的SSS评分显着高于2–3个四分位数（SSS中位数48对37，p ＝ 0,0481），尤其是第1个四分位数（≤ 3,4050pmol／1，SSS中值48对30，p = 0.0018）。在没有先前卒中（n = 124）的患者中，卒中后致残缺乏的风险独立地受fT3影响（0.34，95%CI 0.15–0.77）。根据ROC分析，fT3水平<4,44 pmol／1是致残性缺陷的预测因子（AUC = 0.727，特异性 – 96.4%，敏感性 – 66.8%，p = 0.003）。

结论。该研究证实，低fT3与较大的卒中严重程度和较差的预后相关，而较高水平的fT3可能具有保护作用。在未来的研究中应评估卒中期间额外fT3补充剂的有益作用。

关键词：缺血性中风，预后，甲状腺激素，三碘甲状腺原氨酸。

Abstract. Background. According to recent studies, thyroid hormones may have various effects on stroke severity, course and outcome.

Objective. The aim was to determine the relationship of thyroid hormones with stroke severity in clinical study.

Methods. In this study 168 adult patients with acute ischemic stroke were enrolled. Concentrations of free T3 (fT3), free T4 (fT4), TSH and basic stroke risk factors were assessed during 24h from symptoms onset. Neurological deficit was assessed by Scandinavian Stroke Scale (SSS). Disabling deficit was defined as mRs score ≥ 3 at 6 months after stroke.

Results. ANOVA showed that SSS scores were significantly higher in patients with fT3 level in 4th quartile (≥ 5.35 pmol/l) compared to 2-3rd quartile (SSS median 48 vs. 37, p=0,0481) and especially to 1st quartile ($\leq 3,4050$ pmol/l, SSS median 48 vs. 30, p=0,0018). In patients without prior stroke (n=124) the risk of post-stroke disabling deficit was independently affected by fT3 (0.34, 95% CI 0.15 - 0.77). According to ROC-analysis, fT3 level <4,44 pmol/l was a predictor of disabling deficit (AUC = 0.727, specificity - 96.4%, sensitivity - 66.8%, p = 0.003).

Conclusion. This study confirmed that low fT3 is associated with greater stroke severity and poor outcome, while higher levels of fT3 may have protective role. Beneficial effects of additional fT3 supplement during stroke should be assessed in future studies.

Keywords: *ischemic stroke, outcome, thyroid hormones, triiodothyronine.*

Introduction. Currently, in most countries, stroke is one of the leading causes of death and disability [1]. Despite certain advances in the treatment and prevention of cerebrovascular diseases, stroke remains in second place in the world among the diseases leading to death.

According to numerous clinical studies, the most effective treatment for acute ischemic stroke is the restoration of cerebral blood flow by systemic thrombolysis [2]. However, thrombolytic therapy is possible only within a narrow (3–3,5 hours) therapeutic window; moreover, this treatment method is associated with a relatively high risk of hemorrhagic complications [3]. In cases where thrombolysis is not indicated or there are no opportunities for its implementation, modern approaches to patient management during the acute period of stroke include both secondary prevention of cerebrovascular disease and an attempt to reduce the severity of neurological deficit by protecting ischemic (but potentially viable) brain tissue in penumbra zone [4]. Nevertheless, despite the diversity of neuroprotective drugs, different in their mechanism of action and effective in preclinical studies, none of them has enough clinical efficacy. In this regard, the search for new approaches of neuroprotection remains the most important task of modern neuropharmacology [5].

The survival of the brain tissue under ischemia depends on the intensity of metabolism, oxygen demand, as well as the ability to maintain the redox potential and support the synthesis of high-energy compounds (ATP, etc.). The mechanism of action of most neuroprotectors is based on the effects on these processes [6,7].

Over the past decades, special attention had been paid to the neuroprotective properties of endogenous molecules such as VEGF, erythropoietin, brain neurotrophic factor, etc. It is known that triiodothyronine, an active form of the thyroid hormone thyroxin, separates tissue respiration and oxidative phosphorylation. This process leads to disruption of the Krebs cycle, reduced ATP production, hyperthermia, and has a potentially negative effect in acute cerebral ischemia [9]. On the other hand, it is known that triiodothyronine has several neuroprotective effects - it contributes to the capture of neurotoxic glutamate by astrocytes, stimulation of the Na + / K + membrane channels in neurons, the restoration of intracellular pH [8]. Thus, selective therapeutic effect on thyroid metabolism (stimulation or inhibition of the function of thyroid hormones) may be promising potential target for new approaches in the treatment of stroke.

In recent years, more publications appeared in the literature about the possible effect of thyroid hormones on the risk of development, severity and outcome of acute ischemic stroke. Nevertheless, the results of the published works are rather contradictory [10]. Finally, the nature of the influence of hyper- or hypothyroidism on the course and outcome of a stroke is unknown.

Aims: aim of this study was to determine the relationship between markers of thyroid function and the severity of neurological and functional deficit in acute ischemic stroke.

Materials and methods. 168 patients (women – 71, men – 97) aged 42 to 78 years with acute ischemic heterogeneous stroke were enrolled in this study. 49 patients previously had TIA or ischemic stroke; in 119 patients ischemic stroke developed for the first time. Patients with verified autoimmune thyroiditis or a thyroid tumor were excluded from the study. Within 24 hours from stroke onset basic risk stroke factors (arterial hypertension, carotid stenosis, atrial fibrillation, diabetes mellitus, smoking) were analyzed. Serum free triiodothyronine (fT3), free thyroxine (fT4) and the thyroid stimulator hormone (TSH) were determined using ELISA method. Blood sampling was performed during 24 hours from stroke onset. Neurological deficit was assessed using Scandinavian Stroke Scale (SSS). Poor stroke outcome was assumed as 3 or more points on the modified Rankin Scale (mRs) after 6 months from onset. Thyroid hormones and TSH levels below 25 and above 75 percentiles were assumed as "low" and "high", respectively.

Results. Strokes in the carotid territory were the most frequent (79% of all patients), with the atherothrombotic subtype being the most common (64%). The leading risk factors were arterial hypertension (65%), smoking (42%), coronary heart disease (29%), atrial fibrillation (27%). Characteristics of the examined patients are presented in table 1.

Table 1. Characteristics of the examined patients

Age	71.5 ± 10.6
Sex - male - female	97 (54%) 71 (42%)
Stroke territory - carotid, left hemisphere - carotid, right hemisphere - basilar	72 (43%) 60 (3 %) 36 (21%)
Stroke subtype (TOAST) - atherothrombotic - cardioembolic - cryptogenic - other (hemodynamical, hemorheological)	108 (64%) 37 (22%) 8 (5%) 15 (9%)
Arterial hypertension	109 (65%)
Diabetes	20 (12%)
Ischemic heart disease	49 (29%)
Carotid stenosis (> 70%)	30 (18%)
Atrial fibrillation	46 (27%)
Previous stroke or history of TIA	49 (28%)
Smoking	72 (42%)
On aspirin	39 (23%)

According to the laboratory reference indicators, 112 patients can be classified as euthyroid, 36 patients had clinical and subclinical hypothyroidism, 20 patients had hyperthyroidism. The distribution of thyroid hormones levels is presented in table 2.

Table 2. Distribution of thyroid hormones levels.

	Free T3, pmol / l	Free T4, pmol / l	TSH, IU / l
Median	4.57 (95% CI 4.35 - 4.79)	16.2 (95% CI 15.62 -16,60)	1.28 (95% CI 1.02 - 1.433)
25th percentile	3.545 (95% CI 3,019 - 4.22)	14.65 (95% CI 13.84 - 15.38)	0.86 (95% CI 0.64 - 1.01)
75th percentile	5.35 (95% CI 5.01 - 5.61)	17.5 (95% CI 17.0 - 17.98)	2.1 (95% CI 1.59 - 3.24)

The ANOVA test showed that patients with fT3 level in the IV quartile (≥ 5.35 pmol/L; 95% CI 5.01 - 5.61) had less severe stroke (bigger SSS scores) compared to patients with fT3 level in II - III quartile (SSS median is 48 points in Q4 vs 37 points in Q2-3, $p = 0,0481$), and significantly especially less severe stroke compared to patients whose T3 level was in the first quartile (≤ 3.4050 pmol/l, SSS median 48 points in Q4 vs 30 points in Q1, $p = 0.0018$) . The results of the ANOVA test are presented in Figure 1.
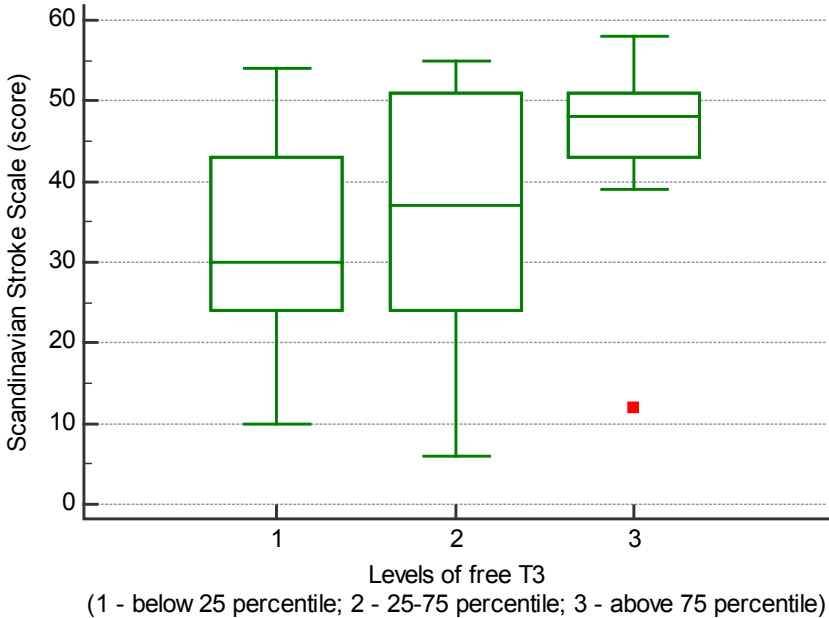
Figure 1. *Analysis of variation of neurological deficit in subgroups depending on fT3 level (ANOVA test)*

The result of ANOVA test suggests that low triiodothyronine levels are associated with a more severe neurological deficit, while high levels may have potential neuroprotective effects.

To clarify the relationship between the severity of neurological deficit and the level of free triiodothyronine in serum, a regression analysis was performed. Univariant regression showed no relationship between the severity of neurological deficit and the level of triiodothyronine. However, after exclusion of patients with previous stroke, a linear dependence of the severity of neurological deficit on the level of free triiodothyronine was detected ($F = 15.7920$, $p = 0,0002$, $R^2 = 0,39$).

To confirm the independent effect of the fT3 level on the severity of stroke and exclude the influence of co-factors, a multivariate regression analysis was performed. The regression model included basic risk stroke factors (age, arterial hypertension, arterial pressure on admission, atrial fibrillation, IHD, diabetes, smoking), C-reactive protein, free thyroxine, TSH, free T3 / free T4 ratio. Variables were introduced the regression model using the forward method.

Multivariate regression analysis showed that the independent factors affecting the severity of neurological deficiency were the level of free triiodothyronine (p = 0.0035) and the level of C-reactive protein (p = 0.0035). Model had the coefficient of variation F=17.45 (p < 0.0001) and R^2 = 0.49. The obtained results confirmed the independent effect of serum free triiodothyronine level on the severity of neurological deficit in newly developed ischemic stroke, while the low levels of triiodothyronine were associated with more severe stroke.

To assess the impact of the fT3 level on stroke outcome the multiple logistic regression method was used. Basic stroke risk factors (age, hypertension, blood pressure at admission, atrial fibrillation, coronary artery disease, diabetes mellitus, smoking) and C-reactive protein, free thyroxine, TSH levels, fT3 / fT4 ratio were included in the regression model. Lower fT3 levels were independently associated with poor stroke outcome (odds ratio = 0.3408, 95% CI 0.15 - 0.77).

In order to determine the critical values of free triiodothyronine, associated with the greatest risk of poor stroke outcome, the analysis of ROC-curves was applied. It was established that level of fT3 < 4.44 pmol/l is a predictor of poor stroke outcome (AUC = 0.727, specificity - 96.4%, sensitivity - 66.8%, p = 0.003). The results of the analysis of ROC curves are presented in Figure 2.
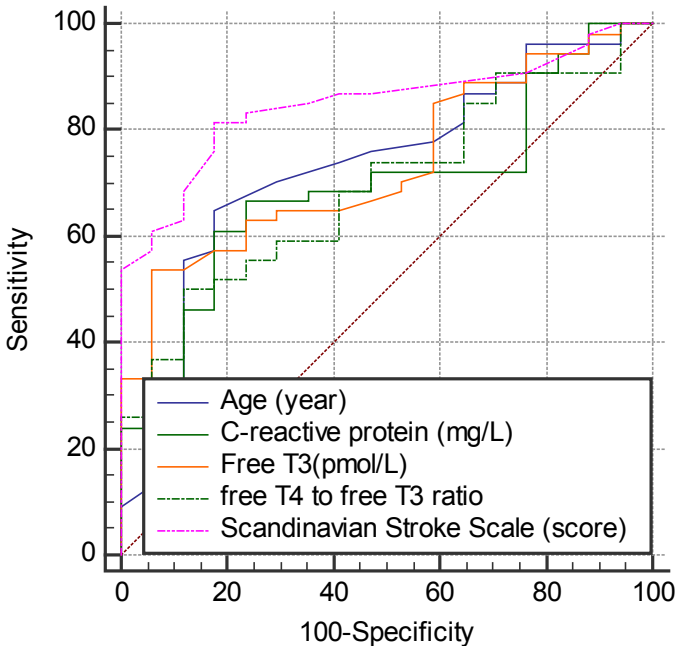

Figure 2. *Comparison of ROC-curves of poor stroke outcome predictors*

Discussion. The results of this study indicate that low serum free triiodothyronine level during stroke onset is associated with a more severe neurological deficit and a high risk of poor outcome. The difference between this and analogical studies is the identification of independent influence of free triiodothyronine on the stroke severity an outcome in multivariate regression analysis. There are several limitations in this study. The main disadvantages are lack of long-term follow-up and inability to use Cox-regression method, and also selection bias (only patients with thyroid hormone analysis were included)

Our results correlate with the fundamental research carried out in recent years. In experimental models, it has been shown that the administration of L-thyroxin after transient cerebral ischemia contributes to an increase in neuron density and stimulation of angiogenesis in the ischemic brain [11]. The results of another in-vitro and research showed that triiodothyronine can recover intracellular concentration of natrium, calcium ions and pH [9]. It was shown that thyroxine stimulates the synthesis of other neurotrophic factors, such as fibroblast growth factor [12].

Several clinical studies also confirm experimental data. Lena M. O'Keefe et al. in a study of 868 patients with heterogeneous ischemic stroke found that a low triiodothyronine level was associated with a more functional deficiency in 3 months after a stroke and with more nosocomial mortality [13]. Results of another study of 833 patients with acute ischemic stroke, indicate that low levels of total triiodothyronine (even within the reference range) were associated with poor stroke outcome [14].

The biological basis of the association of hypothyroidism with the stroke course and outcome has not been finally studied. In this context, researches of new class of thyroid hormones – thyronamines (decarboxylated triiodothyronine derivatives) seems promising. These substances are a new class of endogenous signaling hormones that exhibit significant in-vivo effects, such as:

1) decrease in the rate of basal metabolism, decrease in respiratory rate [15];

2) fast, deep and reversible hypothermia [16];

3) weight loss [17];

4) negative inotropic and chronotropic effects without changing the absorption of glucose and oxygen [18,19];

5) decrease in Ca^{2+} level in the endoplasmic reticulum [20];

6) ischemia resistance [9,19];

7) increase in high-energy compounds level in target cells [17].

Thyronamines have a wide range of potential neuroprotective effects, the most significant of which are induction of hypothermia and a decrease in the rate of basal metabolism. According to Kristian P. Doyle et al., intraperitoneal administration of thyronamines to laboratory mice contributes to a decrease in body temperature from 37 to 31 Celsius degrees, and significantly reduces the infarction zone after

transient cerebral ischemia. At the same time, the observed hypothermia is completely reversible and is not accompanied by any side effects, and its development is not associated with the effects of the known mechanisms of thermoregulation [21].

It is noteworthy that thyronamines, being derivatives of L-thyroxin, have antagonistic properties in relation to it, and the metabolic effects of thyronamines are close to the effects observed in hypothyroidism. It is possible that this phenomenon is the reason for the neuroprotective effects of thyroid hormones.

To confirm the neuroprotective effects of thyronamines, T0AM (thyronamine) was synthesized by our colleagues from the L.M. Litvinenko Institute of Physical Organic Chemistry and Coal Chemistry (Donetsk, Donbass region) for research in animal experimental model. Preliminary results showed that injection of T0AM in a dose of 50 mg / kg to laboratory rats (n=18) leads to a statistically significant decrease in the body temperature of experimental animals compared to controls (n=12). Body temperature dynamics after thyronamine injection is shown in figure 3. Currently, the study of the thyronamine neuroprotective properties in the experimental stroke model is ongoing in our Institute.

Even though in recent years, more and more evidence has been obtained of the influence of thyroid hormones on risk, course and outcome of cerebrovascular disease, the nature and biological basis of this relationship have not been finally identified. This was the basis for initiation in our institute a complex clinical and experimental trial devoted to the study of the possibility of using thyroid hormones and their derivatives as neuroprotective therapy in acute ischemic stroke.

Conclusions. The study showed that a low serum free triiodothyronine level during stroke onset negatively affects the stroke severity and is an independent predictor of its unfavorable outcome. The findings suggest that thyroid metabolism is not only a factor affecting the course and outcome of ischemic stroke, but also a potential target for therapeutic correction. To confirm the effectiveness of this approach, it is necessary to conduct further clinical and experimental studies. It is reasonable to monitor thyroid hormone levels during stroke, while the analysis of serum free triiodothyronine can be used to predict a high risk of an unfavorable stroke outcome.

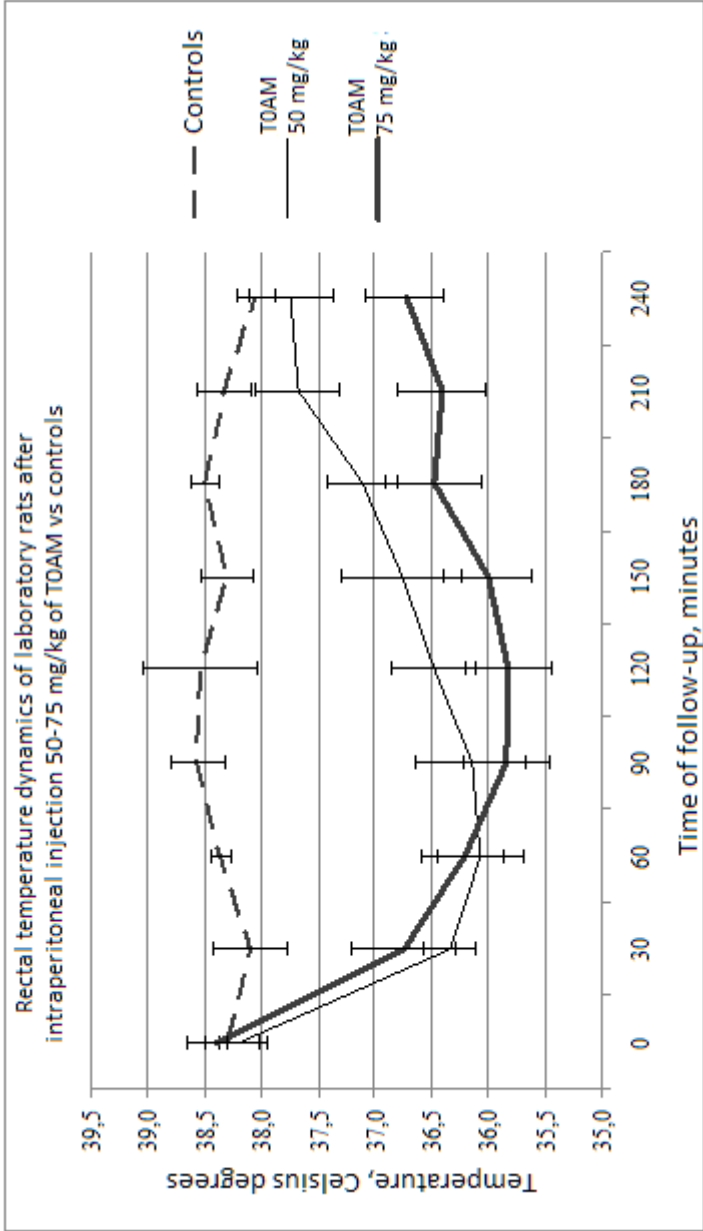The authors declare that they have no competing interests.

Figure 3. *Thermoregulatory effect of thyronamine (TOAM) in experimental animal model*

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弥漫性肝病: 评估ARFI弹性测定的诊断功效
DIFFUSE LIVER DISEASE: ASSESSMENT OF ARFI-ELASTOMETRY DIAGNOSTICS EFFICACY

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　　注解。慢性弥漫性肝病的发展通过纤维化阶段的进展而发生, 最终形成肝硬化和肝癌。用于检测纤维化过程的"黄金标准"是肝脏活组织检查, 然后对所接收的材料进行组织学检查, 但它有其缺点和禁忌症。最近, 弹性测定法变得越来越普遍, 因为它反映了肝脏的刚性, 其在纤维化中增加。然而, 目前还没有用于执行肝脏ARFI弹性测量的标准方案, 其应考虑地形的选择, 轮询区域的安装深度, 剪切波的测量数量。研究目的: 对进行肝脏ARFI弹性测定的程序进行标准化, 以进一步评估纤维化阶段;在纤维化的各个阶段检测肝脏中最敏感的回波描记变化。基于健康志愿者的检查, 开发了一种用于弥漫性肝脏改变的患者的标准化方案。在使用剪切波弹性成像时, 注意到检测到的回波描记症状的数量对应于纤维化的弹性测量阶段并非在所有情况下。在研究期间, 确定在纤维化的F1和F2阶段, 患者中发生1至4个回波描记症状;在F3和F4纤维化阶段 – 相应地从3到11个回波描记症状。值得注意的是, 随着纤维化阶段的增加, 回波描记症状的数量也基本上增加。使用弹性测量法选择一组特殊的患者, 其没有明显的回波描记症状但具有经验证的F2–F4纤维化阶段。在该组中, 42%的经验证的F2–F4纤维化病例未检测到回波描记症状。在F3和F4纤维化阶段的10%病例中, 只有1–2个回波描记症状。因此, 在患者中检测至少一个回波描记症状应该是可能存在纤维化或肝硬化的警告信号。
　　关键词: 弥漫性肝脏改变;超声诊断;剪切波ARFI弹性测量;肝纤维化, 肝硬化。

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Annotation. *Development of chronic diffuse liver diseases occurs through the progression of fibrosis stages with the final formation of cirrhosis and liver cancer. The «gold standard» for detecting the fibrosis process is a liver biopsy followed by a histological examination of the received material, but it has its drawbacks and contraindications. Recently elastometry is becoming increasingly widespread as it reflects the rigidity of the liver, which is increasing in fibrosis. However, at the moment there is no standard protocol for performing ARFI-elastometry of the liver, which should take into account the choice of topography, the depth of installation of the polling zone, the number of measurements of the shear wave. Objectives of the study: standardization of the procedure for performing ARFI-elastometry of the liver for further evaluation of the fibrosis stages; detection of the most sensitive echographic changes in the liver at various stages of fibrosis. Based on healthy volunteers' examinations, a standardized protocol for patients with diffuse liver changes was developed. While using shear wave elastography, it was noted that detected number of echographic symptoms corresponds to the elastometry stage of fibrosis not in all cases. During the study, it was determined that in the F1 and F2 stages of fibrosis, 1 to 4 echographic symptoms occurred in patients; in F3 and F4 fibrosis stages – from 3 to 11 echographic symptoms accordingly. It is noted that with an increase in the fibrosis stage, the number of echographic symptoms is basically increases, too. A special group of patients without obvious echographic symptoms, but with verified F2-F4 fibrosis stages was selected using elastometry. In this group, echographic symptoms were not detected in 42% of cases with verified F2-F4 fibrosis. In 10% of cases with F3 and F4 fibrosis stages there were only 1–2 echographic symptoms. Thus, the detection of at least a single echographic symptom in the patient should be the warning sign of possible presence of fibrosis or cirrhosis.*

Key words: *diffuse liver changes; ultrasound diagnostics; shear wave ARFI-elastometry; liver fibrosis, liver cirrhosis.*

Introduction. Diffuse liver disease includes various disorders of the structure and functional ability of the organ, caused by prolonged and systematic exposure to a different etiological factor. Viral and autoimmune hepatitis, congenital and acquired immunodeficiency states, syndromic metabolic disorders, toxic effects of drugs can cause irreversible hepatic cell dysfunction. Further «development» of chronic diffuse liver diseases occurs through the progression of fibrosis stages with the formation of cirrhosis and liver cancer in the end. Fibrosis is a dynamic process that has the possibility of progressive flow, long-term stabilization and even reverse development under favorable conditions [1].

To date, the main problem in modern Hepatology is liver cirrhosis. Cirrhosis of the liver is the final stage of fibrous changes.

Cirrhosis is a chronic diffuse liver disease characterized by a violation of its

normal structure as a result of necrosis and a decrease in the mass of functioning cells, the development of connective tissue (fibrosis) and regeneration nodes. Cirrhosis develops in 20-30% of patients with chronic hepatopathy [2, 3, 4, 5].

For detecting the process of fibrosis liver biopsy with subsequent histological examination of the obtained material is the «gold standard» of the available methods nowadays. However, because this method is invasive, when using it, it is necessary to consider the presence of contraindications and the possibility of life-threatening complications, the experience of a specialist, and in some cases, insufficient sensitivity, since the volume of tissue taken is only $1/50\,000$ of organ [6]. All this limit the possibility of using biopsies as a screening method. It is also not accepted to repeat the puncture at intervals of 6-12 months [2]. It is important not only to determine the severity of liver damage once, but also to provide an opportunity for informative control on the background of the treatment (for example, to assess the effectiveness of treatment against the background of antiviral therapy of hepatitis patients) [7].

Thus, the Draft global health sector strategies on viral hepatitis for 2016-2021 states that «priority should be given to the development of ... simplified methods for reliable assessment of liver fibrosis and cirrhosis» [8].

One of the promising methods is the use of ultrasound for liver research. However, the possibility of differential diagnosis of diffuse liver diseases in grayscale mode to date is extremely limited and reliably allow us to determine only the advanced stages of fibrosis.

In this case, it is promising are «physical» non-invasive methods based on the determination of the density of the liver (transient elastography and point SWE elastography) [9-11].

Elasticity (elasticity, compressibility) is an important property of the tissue, which depends on its mechanical properties and can change under the influence of pathophysiological processes such as inflammation, atrophy, tumor damage. Elasticity describes the pressure that must be applied to the tissue for its deformation [12]. A distinctive feature of fibrous liver changes, as in the case of similar processes in other parenchymal organs, is a diffuse increase in stiffness (reduced elasticity) of its tissue.

Elastography is a diagnostic method that reflects the elastic properties of soft tissues [13, 14]. It is based on a simple principle: all human tissues have a certain elasticity (stiffness), which varies depending on the structural organization of the tissue and the presence of pathological processes in it [15]. The physical basis of elastography is the Young's modulus, which is determined during the study. It characterizes the properties of soft tissues to resist stretching/compression during their elastic deformation. Young's modulus can be calculated in two ways. In this regard, elastography is divided into two types – compression elastography and shear wave

elastometry. Compression elastography allows to obtain only qualitative characteristics of tissue stiffness, while methods using shear waves make it possible to quantify Young's modulus (determine the elasticity in numerical terms – in kPa, in m/s).

The principle of using of the shear wave elastography method is based on the generation of a shear wave in the tissues and the subsequent assessment of its velocity. Generation of shear waves is carried out electronically (using the pressure force of a powerful pulse of the ultrasonic beam = ARFI – Acoustic Radiation Force Impulse). A powerful acoustic pulse passes through the tissues and displaces them. Tissue displacement causes the formation of shear waves propagating the tissues perpendicular to the external action. As soon as the shear (transverse) wave passes through the tissues, tissue displacements are recorded by the apparatus and displayed as the shear wave velocity in m/s. It will be higher where the elasticity of the tissue is less [6, 13, 16-19].

To assess the values for elastography of the liver the most widespread currently received the METAVIR score. Initially, this classification was pathomorphological. That is, based on histological changes, fibrosis stages from F0 to F4 were determined. With the introduction of elastography values of the shear wave velocity in the course of numerous studies were correlated with the corresponding stages of fibrosis by METAVIR [11]: F0 – absence of fibrosis (0,70-1,39 m/s); F1 – expansion of portal tracts without septa formation (1,40-1,55 m/s); F2 – portal fibrosis in combination with single septa (1,56-1,78 m/s); F3 – portal fibrosis in combination with multiple septa without false lobes (1,79-2,04 m/s); F4 – liver cirrhosis (more than 2,04 m/s). Thus, now it is possible to study liver changes using standard B-mode or elastometry [10-11, 20-22].

However, during the study, we came to conclusion that there is no standard Protocol for perfoming ARFI-elastometry of the liver, considering the choice of topography, the depth of the survey area, the number of measurements of the shear wave. Also, during the application of the developed technique, inconsistencies between the symptoms of liver fibrosis detected in the standard ultrasound study and elastometry data were revealed.

Purpose. Standardization of liver ARFI-elastometry methods for further assessment of fibrosis stages, as well as identification of the most sensitive echographic liver changes at different stages of fibrosis.

Materials and methods. To standardize the technique of ARFI-liver elastometry, 30 healthy volunteers were examined using Acuson S2000 (Siemens, Germany) convex sensor (6C1) in the mode of Virtual Touch Tissue Quantification based on the Clinical and Diagnostic Center of the Baltic Federal University of Immanuel Kant.

The age of volunteers ranged from 18 to 30 years, the body mass index corresponded to the normative values.

All volunteers had no complaints, liver disease and right-sided congestive heart failure in anamnesis, alcohol abuse. The study was conducted strictly on an empty stomach or the period from the last meal not less than 6 hours for a comprehensive evaluation of the abdominal cavity and exclusion of comorbidity, we started with standard examination in B-mode.

Speed measurement of shear waves was performed in the supine position and on the left side with its right hand behind the head in the right lobe: subcostal access, in the tenth intercostal space at mid-axillary line in the ninth, eighth and seventh intercostal spaces at the anterior axillary line and in the sixth and fifth intercostal spaces at the midclavicular line and in the left lobe. From 3 to 5 measurements were carried out at each access point, the average value and median were calculated from the obtained results. The elastography was performed during breath hold no longer than 10 seconds (or shallow breathing). Measurements were carried out at a depth of at least 20 mm from the capsule, since the proximity of the connective tissue of the Glisson's capsule, which had increased stiffness, could affect the increase in the shear wave velocity. For the same reasons, the survey area was located away from large vessels and the main biliary tract. As an optimal zone of initial elastometric assessment, we propose to use the V segment of the liver, which has a minimum number of large vascular structures and the most remote from cardiac and respiratory movements, reducing the accuracy of measurements.

If an invalid value of the wave shear rate was obtained (represented as XXX. XX), the measurement was repeated until a valid value was obtained.

The stage of fibrosis was evaluated on the METAVIR scale. Statistical processing of the results was carried out using a computer program Excel 2000.

The values of the shear wave velocity corresponded to the normative values (F0) only in the position on the back in the ninth, eighth and seventh intercostals along the anterior axillary line at a depth of 2,0 to 6,0 cm of the skin surface, which became the standard for further examinations [23, 24]. Also, only at these access points in the back position, the interquartile range was less than 30%.

For comparison of echographic changes in the liver at different stages of fibrosis 72 patients were examined. All patients underwent standard ultrasound examination of the liver, spleen and liver ARFI-elastometry using an ultrasound scanner Acuson S2000 (Siemens, Germany) according to the above mentioned procedure [24-26].

The results of the measurements were recorded in a specially designed module of automated ultrasonographer's workstation «Assistant» [24]. The median of the measurements was calculated and in accordance with the METAVIR scale the degree of fibrosis (F0/1/2/3/4) was determined.

On the basis of obtained results the patients were divided into three groups: the 1st group consisted of 17 patients with F1 and F2 stages of fibrosis; the 2nd group – 43 patients with verified using elastography fibrosis stages F3 and F4; the 3rd

group – 12 patients (9 men and 3 women) without obvious sonographic symptoms, but verifiable fibrosis F2-F4 for elastography.

Results and discussion. Based on the examination of healthy volunteers, a standardized Protocol was developed and integrated into the automated ultra-sonographer's workstation «Assistant».

It was revealed that at the stages of fibrosis F1 and F2 patients had from 1 to 4 echographic symptoms; at fibrosis F3 and F4 – from 3 to 11 echographic symptoms. It was allocated a special group of patients – 12 patients without any apparent sonographic symptoms, but with estimated F2-F4 fibrosis stage elastographyically. In this group, echographic symptoms were not determined in 42% of cases, which was 7% of the total number of patients.

Group 1 patients were found to have 1 to 4 echographic symptoms. According to the frequency of detection, they can be arranged in the following sequence:

1) increase in the size of the left lobe of the liver mainly due to the increased thickness in 14 patients (82%);

2) increased spleen size in 8 patients (47%);

3) changes in liver echostructure in 5 patients (29%);

4) increase in the ratio between the thickness of the caudate lobe and the left lobe more than 1:3 in 3 patients (18%);

5) increase in the diameter of the portal vein in 2 patients (12%);

6) increase in of right lobe in 2 patients (12%);

7) rounding of the left lobe angle in 1 patient (6%).

In patients of the second group were identified from 3 to 11 echographic symptoms. The most common of them can be built in the following sequence:

1) increase in the size of the left lobe mainly due to the thickness in 40 patients (93%);

2) increased spleen size in 33 patients (77%);

3) changes in liver echostructure in 28 patients (65%);

4) increase in the ratio between the thickness of the caudate lobe and the left lobe of more than 1:3 in 20 patients (47%);

5) increase in right-wing vertical oblique size in 19 patients (44%);

6) monophasic blood flow in the portal vein in 15 patients (35%).

The remaining symptoms occurred in a lesser percentage of cases.

Patients of the third group had from 0 to 2 echographic symptoms. The most commonly identified symptom is an increase in the left lobe of the liver mainly due to the thickness in 6 patients (50%). The increase in the vertical size of the left lobe, the ratio between the thickness of the caudate lobe and the left lobe and the change in the echostructure of the liver and the symptom of the dotted line were found only in isolated cases. Echographic symptoms were not detected in 42% of the patients in this group with detected F2-F4 fibrosis stage.

In women of this group, 1 or 2 echographic symptoms were encountered in 100% of cases (3 patients) with verified F3 and F4 stages. In men, 1 or 2 echographic symptoms were found in 44% of cases (4 patients out of 9 – in F3 and F4), in the remaining 56% of cases (5 patients out of 9) no echographic symptoms were detected. In this case, two men had F2, one – F3, two – F4 fibrosis stage.

Conclusions.

Using a standardized technique it was revealed that the higher the fibrosis stage, the more echographic symptoms of diffuse liver disease take place in patients with F1 to F4 stages.

At any stage of fibrosis, the most sensitive echographic changes are: an increase in the size of the left lobe of the liver due to thickness, an increase in the size of the spleen, an alteration of the echogaraphic structure of the liver, an increased ratio between the thickness of the caudate lobe to the thickness of left lobe more than 1:3.

In patients with F1-F4 fibrosis stages the echographic symptoms of diffuse liver disease were detected in 93% of cases ($p<0,01$). In 10% of patients with F3 and F4 stages of fibrosis there were detected no more then 1-2 echographic symptoms of diffuse liver disease. Therefore, when using conventional B-mode ultrasound the fact of absence of echographic symptoms of diffuse liver disease or mild symptoms does not exclude the presence of liver fibrosis and early stage of cirrhosis.

The absence of echographic symptoms of diffuse liver disease in patient with F2-F4 fibrosis stage was revealed only in group of men.

Thus:

A standardized technique is necessary when performing ARFI-elastometry for decreasing of radiologist subjectivism level in liver fibrosis staging. We has developed and integrated standardized technique of ARFI-elastometry into the automated workstation for ultrasonic diagnostics «Assistant». This development allows radiologist to make a conclusion about fibrosis stage automatically after exporting the measurement results into workstation by calculating the median and comparing it with the METAVIR scale.

Radiologist should have an alert of the possible presence of liver fibrosis or cirrhosis when only single echographic symptom is detected in conventional ultrasound.

It is necessary to include elastography in the diagnostic minimum of liver ultrasound. This will allow detecting fibrous changes in cases when they are not visualized in the standard B-mode.

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2型糖尿病患者深部股动脉动脉硬化病的方面
ASPECTS OF ARTERIAL SCLEROTIC DISEASE OF DEEP FEMORAL ARTERY AT PATIENTS WITH DIABETES MELLITUS TYPE 2

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抽象。 检查了42例糖尿病患者；有两组人员，心血管疾病患者被列入其中一组。 通过使用下肢动脉彩色双功能超声检查，研究了深部股动脉超声特征的动脉粥样硬化疾病，我们发现组合病理组的内膜 – 中膜复合体具有统计学意义。合并心血管疾病患者群中狭窄性闭塞症患病率的趋势。
关键词：2型糖尿病，心血管疾病，下肢动脉粥样硬化性疾病，股深动脉，颈动脉内膜 – 中膜厚度。

Abstract. 42 patients with diabetes mellitus were examined; there were two groups formed up, patients with cardiovascular disease were included in one of these groups. Through the use of colour duplex ultrasonography of arteries of lower limbs, atherosclerotic disease of deep femoral artery's suprasonic characteristics were researched, we discovered statistically significant value's exceedance of intima-media complex in group with combined pathology. The tendency to prevalence rate of steno-occlusive disease in group of patients with comorbid cardiovascular disease.

Keywords: diabetes mellitus type 2, cardiovascular disease, atherosclerotic disease of lower limbs' arteries, deep femoral artery, carotid Intima-Media thickness.

Atherosclerosis and diabetes mellitus (DM) are medical and social problems, which significantly reduce longevity and its quality. Earlier incipience and aggressive course of atherosclerosis in patients with diabetes mellitus type 2 are often connected with co-morbid cardiovascular disease (CAD). So, atherosclerosis, in cases if DM type 2, more often has multifocal generalization and along with coronary arteries damages noncardial arterial districts as well. Macrovascular compli-

cations have 16-58% patients with diabetes mellitus [10]. Many authors notice that in patients with diabetes mellitus prevalence in lower legs artery diseases [11, 1, 4, 7, 2]. However, it was proved that atherosclerotic diseases of lower limbs' vessels in the presence of DM have multiple, multisegmental, diffuse nature [9, 12, 3, 2]. This shows us the necessary for research the specific of big diameters arteries' diseases in presence of DM type 2, especially deep femoral artery (DFA).

Research objective: to elucidate ultrasonic characteristics of atherosclerotic disease of DFA in patients with DM type 2depending on presence or absence of cardiovascular disease.

Materials and methods: 42 patients with atherosclerosis of lower limbs associated with DM were examined at hospital and on an ambulatory basis. During the research two groups of patients were formed: Group A is formed of patients with CAD: effort angina 2-3 functional class, of these 13 women (61,9%) and 8 (38,1%) men; Group B is without CAD: 14 women (66,6%) and 7 (33,4%). Group A's patients age is 56-73 y.o.; Group B's is 50-69 y.o.

During the research we analyzedpatients' anamnesis, general clinic tests and ultrasound imagining of peripheral arterial districts. We used "Mindray" apparatus for colour duplexscanning of lower limbs' arteries (LLA) to prove presence and to estimate prevalence rate of atherosclerotic disease. We estimated following ultrasound indexes: systolic blood flow velocity (SBFV), the thickness of intima-media complex (TIMC), resistivity index (RI), degree of stenosis, presence of atheroma.

Statistical manipulations were made using IBM SPSS Statistics, v 19.0. We used Mann-Whitney U-test to compare groups with distribution other than normal. When we compared qualitative character, we used criterion $\chi 2$.

Results and discussion: Significant intergroup differences for age, sex and diabetes duration have not been obtained.

Identified variants for lesions of the DFA: 23% patients of Group A have occlusion, Group B – 11%; 19% patients of Group A have stenosis, Group B – 18%. There was a trend towards the prevalence of the frequency of steno-occlusive lesions in the Group A. Also, diabetic patients occlusive-stenotic processes in the majority of cases were two-sided nature of the lesion of the vascular bed.

In the study, the following ultrasound structural and functional characteristics of the DFA was obtained: Group's A SBFV is $62,63\pm17,27$cm/s, Group's B is $63,9\pm18,63$cm/s (p>0,05); the thickness of intima-media complex (IMC) resp. $1,04\pm0,25$mm, $0,86\pm0,1$ (p=0,02); RI - $0,99\pm0,05$, $0,99\pm0,3$ (p>0,05).

In both groups, the difference in the values of SBFV and RI is statistically insignificant. It is a significant difference in the TIMC in groups A and B was found. The excess of the TIMC in the group A compared to the B showed us the need to assess the frequency of occurrence of structural changes in the vascular wall in the designated groups.

TIMC' value is reliable criterion for intensity of atherosclerosis [8], which also has a prognostic value [9]. At the same time, the ankle-brachial index (ABI) in patients with diabetes may not accurately reflect the dynamics of the process. The fact is that with diabetes, an increase in the stiffness of the arteries of the lower extremities is noted due to the calcification of the media [12], which leads to an increase in ABI to 1.3–1.4 or more [14]. It appears that with a less pronounced defeat of the media in patients with diabetes, the phenomenon of "pseudonormalization" of ABI can be observed.n clinical practice, cases of normal ABI values with manifestations of atherosclerosis LLA in diabetic patients are often found [6]. This is evidenced by data from a study in which, when verifying peripheral atherosclerosis using magnetic resonance angiography, the sensitivity of ABI (with <0.9) in detecting pelvic and lower extremity stenosis 50% or more was only 25% for the right side and 15% for left, with a specificity of 99% [15]. Apparently, in patients with diabetes it is more correct to use the assessment in the dynamics of TIM [13] in the femoral arteries [5].

The presence of atherosclerotic plaques was not significantly different in the studied groups.

This study demonstrates that GBA is susceptible to atherosclerotic lesions in diabetes. At the same time, significantly worse indicators were found in the group of patients with the presence of concomitant coronary heart disease.

Conclusion:

1. Detailed ultrasound angioscanning can detect various variants of the atherosclerotic lesion of the deep femoral artery in the majority of patients with type 2 diabetes, including preclinical signs of atherosclerosis.

2. The intima-media complex in the deep femoral artery is significantly higher in the comorbid pathology group.

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heteratisine和6-0-苯甲酰基heteratisine对大鼠主动脉平滑肌细胞收缩活动的协同血管舒张作用

THE COMPORATIVE VASORELAXANT EFFECT OF HETERATISINE AND 6–*O*–BENZOYL HETERATISINE ON CONTRACTILE ACTIVITY OF RAT AORTA SMOOTH MUSCLE CELLS

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抽象。　　研究了heteratisine和6-0-苯甲酰基heteratisine对大鼠主动脉平滑肌细胞（SMC）收缩活动的影响。　使用力传感器FT-03（Grass Instrument Co.，USA）记录等长张力。　实验表明，heteratisine的血管舒张作用主要与$Ca2+$ L-通道，受体操纵的$Ca2+$通道（ROCC）和储存操作的$Ca2+$通道（SOCC）阻断有关。结果发现6-0-苯甲酰基heteratisine的血管舒张作用与辛二酸与C（6）　–　位置中苯甲酰基的位置不同，不仅与$Ca2+$ L-通道阻滞有关，而且与SOCC／ROCC $Ca2+$ L-通道，以及NO／GC／cGMP／PKG途径的激活。
关键词：geteratisine，6-0-苯甲酰基geteratisine，离体大鼠主动脉，血管舒张作用，Ｃａ2+ L-通道，NO-合成酶，NO／cGC／cGMP／PKG途径。

Abstract. The effect of heteratisine and 6–O–benzoyl heteratisine on the contractile activity of the rat aorta smooth muscle cells (SMC) was studied. Isometric tension forces were recorded using a force transducer FT–03 (Grass Instrument

Co., USA). The experiments revealed that the vasorelaxant effect of heteratisine was mainly associated with the Ca^{2+}_L–channels, receptor–operated Ca^{2+}–channels (ROCC), and store–operated Ca^{2+}–channels (SOCC) blockade. It was found that the vasorelaxant effect of 6–O–benzoyl heteratisine, which differs from heteratesine with the location of the benzoyl group in C(6)–position, is associated not only with the Ca^{2+}_L–channels blockade, and SOCC/ROCC Ca^{2+}_L–channels, and the activation of the NO/GC/cGMP/PKG pathway.

*   **Keywords:** geteratisine, 6–O–benzoyl geteratisine, isolated rat aorta, vasorelaxant effect, Ca^{2+}_L–channels, NO–synthase, NO/cGC/cGMP/PKG pathway.*

Biological active substances isolated from medicinal plants are considered promising therapeutic agents in official pharmaceuticals [Abbott, 2005]. And currently ~25% of pharmacological drugs used in medical practice are directly/indirectly related to plant–derived substances [Shu, 1998]. From this point of view, one of the most promising plants is *Aconitum* L. Currently, over ~300 species of *Aconitum* L. (Ranunculaceae) are identified in the global flora, ~76 species are used for therapeutic purposes in traditional medicine and official pharmaceuticals of the East, China and the Far East countries [Nyirimigabo et al., 2014].

The purpose of this research is to study the vasorelaxant effect of the diterpenoid alkaloids heteratisine and 6–O–benzoyl heteratisine, isolated from the plant *Aconitum zeravshanicum* on the contractile activity of the rat aortic smooth muscle preparation.

Material and methods. In the experiments, white, outbred rats (150–200 g) were immobilized with diethyl ether, anesthetized using cervical dislocation, and a preparation of the aortic vessel was prepared (l =~3–4 mm) and placed in an experimental mesh (5 ml) with saline Krebs–Henseleit. The experiments fully complied with the Internationally Accepted "Rules for the Use of Animals in Biomedical Experiments" (CIOMS, 1985). The physiological solution was aerated with carbogen (O_2–95%, CO_2–5%), the temperature was provided with the help of the U–8 ultrathermostat (made in Bulgaria). The force of muscle contraction in the isometric condition was registered using the FT–03 sensor (Grass Instrument Co., USA) by the standard method [Vandier et al., 2002]. All reagents, which were used in experiments, were of analytic–grade (NaCl, KCl, $CaCl_2$, $MgSO_4$, KH_2PO_4, glucose, $NaHCO_3$), were obtained from "Sigma–Chemical" (St. Louis, Missouri, USA). Ca^{2+}_L–channels was inhibited by 0.01 micromol/L verapamil hydrochloride ("Sigma Aldrich"; Germany). L–NAME (N^ω–nitro–L–arginine methyl ester, "Sigma–Aldrich"; Germany), a *e*NOS antagonist [Martinsen et al., 2010], and verapamil hydrochloride, a selective Ca^{2+}_L–channels antagonist dissolved in distilled water. In the experiments, modified the physiological Krebs–Henseleit solution containing (in mM): NaCl – 118.6; KCl – 4.8; $CaCl_2$ – 2.5; $MgSO_4$ – 1.2; KH_2PO_4

– 1.2; $NaHCO_3$ – 20, glucose – 10 (pH=7.4) were used. This Krebs–Henseleit solution which was continuously bubbled with 95% O_2 and 5% CO_2 and kept at a temperature of $+36\pm0.5°C$ by means of water heating system controlled by temperature controller U1 (Russia), and flowed in and out of the organ bath at a rate of 3–5 ml/min with the peristaltic pump LKB Bromma (Sweden). A smooth aortic muscle contraction was caused by KCl (50 mM) and phenylephrine (1 µM), an α_1–adrenoreceptor agonist [Vandier et al., 2002].

The results were statistically processed by a special software package Origin-Pro v. 8.5 SR1 (EULA, USA). The results of experiments processed mathematically–statistically using standard biometric methods [Lakin, 1990]. The effects of alkaloids and verapamil hydrochloride, a selective Ca^{2+}_L–channels antagonist were compared by determining the effective concentration of the preparations (EC_{50}) which caused a 50% relaxation (*vs*. the maximum KCl (50 mM)–induced contraction) of rat aorta segments, by the method of cumulative curves. The results are given in the $M\pm m$ form of the values of the experiments carried out in *n* replicates, *M* is the arithmetic average value and *m* is the standard error value. In addition, the results of the experiments, a statistically significant level of values between the groups were calculated using the Student's *t*–test and were evaluated as statistically reliable at *p* values <0.05, $p<0.01$.

Result and discussion. In the experiments, it was found that alkaloids heteratisine and 6–*O*–benzoyl heteratisine, depending on the concentration, have a vasorelaxant effect on the contraction force of the rat aortic smooth muscle preparation, caused by KCl (50 mM). At the same time, it was found that the EC_{50} (concentration reducing the reduction by 50%) for heteratisine and 6–*O*–benzoyl heteratisine was respectively 36.9 µM or pD_2 ($-logEC_{50}$)=4.433 and 50.47 µM or $pD_2(-logEC_{50})$=4.297. It is known that, under the influence of KCl (50 mM), the depolarization of the plasma membrane of the muscle and, in turn, the activation of Ca^{2+}_L–channels induces a contraction [Karaki, 1997; Berridge, 2008]. Similarly, in experiments with the Ca^{2+}_L–channel blocker – verapamil (EC_{50}=0.01 µM), the vasorelaxant effect is heteratisine (EC_{50}=36.9 µM) and 6–*O*–benzoyl heteratisine (EC_{50}=50.47 µM) with respect to the control was respectively – 52.6 ± 3.5% and 62.5 ± 4.2. Based on the results of the experiments and the analysis of literature data, it was suggested that the vasorelaxant effect of the alkaloids heteratisine and 6– *O*–benzoyl heteratisine was associated with the blockade of Ca^{2+}_L–channels.

In subsequent experiments, it was found that heteratisine and 6–*O*–benzoyl heteratisine have a significant vasorelaxant effect on the contraction force caused by the α_1–adrenoreceptor agonist phenylephrine (1 µM). It was found that the EC_{50} for heteratesine and 6–*O*–benzoyl heteratisine was, respectively, 33.1 µM or $pD_2(-logEC_{50})$=4.48 and 33.4 µM or $pD_2(-logEC_{50})$=4.476.

It is known that on the smooth muscle in the contractile process caused by phenylephrine (1 μM) the sarcoplasmic reticulum functions IP3 receptor, receptor–operated Ca^{2+}–channels (ROCC), store–operated Ca^{2+}–channels (SOCC) [Karaki et al., 1997; Buus et al., 1998; Webb, 2003].

Based on the analysis of the data and the results of the experiment, it is assumed that ROCC and SOCC modulation is involved in the vasorelaxant effect of hetaratisine and 6–O– benzoyl heteratisine.

In the following experiments, the hypothetical involvement of the cascade activation of NO/cGC/cGMP/PKG reactions in vasorelaxant effects of hetaratisine and 6–O–benzoyl heteratisine was studied. The experiments revealed that when the endothelial layer was removed and also under conditions of incubation with the participation of the NO synthase blocker – L – NAME (100 μM) vasorelaxant, the influence of the alkaloid heteratesine (200 μM) did not change significantly, but the effect of 6–O–benzoyl heteratisine (10–250 μM) is reduced. The group of the cyclase (GC) can be activated by the group. L–channels SMC [Dukhanin et al., 1994].

Analysis of the obtained results and literature data showed that vasorelaxant effects of hetaratisine and 6–O–benzoyl heteratisine are associated with the activation of the cascade reactions NO/GC/cGMP/PKG.

Conclusion. Diterpenoid alkaloids, hetaratisine and 6–O–benzoyl heteratisine, isolated from the plant *Aconitum zeravshanicum* have a marked vasorelaxant effect. Vasorelaxant effect of hetaratisine is mainly associated with the Ca^{2+}_{L}–channel, and SOCC/ROCC blockade. The vasorelaxant effect of 6–O–benzoyl heteratisine, characterized by the location of the benzoyl group in the C(6)–position, is linked by the Ca^{2+}_{L}–channel and the SOCC/ROCC blockade, and the cascade activation by the NO/GC/cGMP/PKG.

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动态电刺激对实验性氧化应激中抗氧化系统活性的影响
THE INFLUENCE OF DYNAMIC ELECTRONEUROSTIMULATION ON THE ACTIVITY OF THE ANTIOXIDANT SYSTEM IN EXPERIMENTAL OXIDATIVE STRESS

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抽象。　该研究提出了在四氧嘧啶诱导的高血糖症条件下在实验动物中应用动态电神经刺激的自由基过程和抗氧化系统的指标。　动态电神经刺激降低了动物肝脏中活性硫代巴比妥酸产物的水平，增加了其抗氧化保护活性并防止了氧化应激的发展。

关键词：动态电刺激，脂质过氧化，应激，自由基过程，慢性高血糖，四氧嘧啶。

Abstract. The study presents indicators of free radical processes and antioxidant system in the application of dynamic electroneurostimulation in experimental animals under conditions of alloxan-induced hyperglycemia. Dynamic electroneurostimulation reduced the level of active thiobarbituric acid products in the liver of animals, increased the activity of their antioxidant protection and prevented the development of oxidative stress.

Key words: dynamic electroneurostimulation, lipid peroxidation, stress, free radical processes, chronic hyperglycemia, alloxan.

It is known that any adaptive or pathological process takes place against the background of the formation of active oxygen forms and the enhancement of free-radical oxidation of biosubstrates [1, 2]. In response, the antioxidant system is activated. The end result of the adaptation process is the adaptation of the organism to new environmental conditions or the breakdown of adaptive mechanisms. At the same time, a state of "oxidative stress" develops, the result of which is the

accumulation of highly toxic compounds leading to a violation of the functional status of cells and tissues [4]. Oxidative stress is a trigger point in the development of a number of diseases, such as atherosclerosis, coronary heart disease, carcinogenesis and diabetes mellitus.

In experimental diabetology, a model of alloxan diabetes is used. The mechanism of diabethogenic action of alloxan is based on the fact that glucose and alloxan molecules are similar in chemical structure, which allows alloxan to freely penetrate into cells, initiating chains of free-radical reactions in them with the development of degenerative-necrotic β-cell changes and their apoptosis. One of the reasons for the selective toxicity of alloxan for β-cells is their low enzymatic protection against the initiation of lipid peroxidation processes against the background of an overall increase in blood glucose levels. Chronic hyperglycemia, which is the main and objective sign of the presence of diabetes mellitus, is initiated by several biochemical processes, which include: excessive formation of final glycation products, lipoprotein metabolism and oxidative stress [5].

Much attention is paid to the problem of the correction of oxidative stress. Today, the antioxidant properties of many vitamins, trace elements, herbal remedies, etc. are well studied. However, the mechanisms of physiotherapeutic methods of exposure in these conditions are not well understood.

The method of dynamic electroneurostimulation (DENS) is a method of percutaneous exposure to specific areas of the body. DENS - based therapy is based on multilevel reflex and neurochemical reactions that trigger a cascade of regulatory and adaptation mechanisms of the body. **DENS-therapy is a treatment method officially approved by the Ministry of Health of Russia** (registration certificate No. FS-2005/004 dated March 04, 2005). All devices developed by DENAS Group comply with Russian and international quality standards and are certified not only in Russia, but also in the CIS countries and Europe. Devices of the DENAS and DiaDENS family have received EURO CAT certificates, which testify that they comply with ISO 9000 international standards. (EuroCat Company certifies equipment in the European Union countries).

The device regulates the exchange of information processes in the body. The impulse generated by the device and similar in its parameters to the alternating pulsed current circulating inside the body either immediately eliminates disruptions in the information flow of the body, or a weakened signal from the diseased organ increases to such an extent that it is slightly distorted. Thus, the body's self-regulation mechanism (compensatory reactions) is triggered, ultimately leading to the restoration of lost health functions [6].

Objective: to determine the role of dynamic electroneurostimulation in the correction of alloxan-induced hyperglycemia of the animals under experiment.

Materials and research methods: The experiments were carried out in compliance with the principles of humanity set forth in the directives of the European Community (86/609 / EEC) and the Helsinki Declaration, in accordance with the "Rules for work with experimental animals". During the experiment, the conditions of asepsis and antiseptics

were observed. The study used sexually purebred outbred rats - females, which were kept in individual cages on a standard vivarium diet with free access to food and water. Animals were previously tested by the method of "open field" for resistance to emotional stress [3].

Hyperglycemia was caused by a single intraperitoneal administration of a diabetogenic dose of 170 mg / kg of body weight of alloxan tetrahydrate (mesoxalilurea, FlukaChemika, Sweden). Immobilization stress was modeled by daily, hourly rigid fixation of animals to laboratory machines, belly up for 30 days. Before the start of the experiments, rats were divided into experimental and control groups. The experimental group of animals was daily subjected to dynamic electroneurostimulation (using the DiaDENS-PKM apparatus), applying the device electrodes to the rat tail for 10 minutes. The control group of animals at the same time put not included device.

In the dynamics of the development of hyperglycemia, the glucose level was determined using the Accu-Check glucometer and glycosylated hemoglobin in the blood using Bio-La-Test kits (ErbaLachema, Czech Republic). After the end of the experiments in the homogenates of the liver, the level of catalase and the active products of thiobarbituric acid (TBC –active products) were determined. The intensity of the stress reaction was determined using the change in the level of 11-hydroxycorticosteroids (11-ACS) in the blood plasma. The effectiveness of the experimental model of hyperglycemia was evaluated by the general condition of the animals, the dynamics of body weight and the level of glucose and glycosylated hemoglobin in the blood.

Discussion: As a result of the study, it was established that intraperitoneal administration of alloxan led to the development of hyperglycemia. Already on the 2nd day after the administration of alloxan, polydipsia, polyuria was observed in animals and there was a decrease in body weight. When the rats were weighed on the 30th day, the weight of the animals decreased by 11.3% in the experimental group and by 17.5% in the control group. Disruption of the insulin-producing function of the pancreas and the onset of a diabethogenic state in rats administered with alloxan was confirmed by an increase in the glucose concentration in the blood of animals on days 5, 15 and 30 an increase in glycated hemoglobin on day 30 compared to intact animals. In the experimental group, the glucose level on the 5th day was 7.6 ± 0.38 mmol / l, on the 15th day - 6.8 ± 1.8 mmol / l, on the 30th day - 5.35 ± 0.28 mmol / l, when in the control group the glucose level was 8.29 ± 1.8 mmol / l, 7.1 ± 0.7 mmol / l, 8.96 ± 0.47 mmol / l, respectively ($P < 0.05$). The glycohemoglobin level in the experimental group was 3.29 ± 0.23 mmol fructose / g Hb, in the control group 9.21 ± 0.72 mmol fructose / g Hb ($P < 0.05$). Thus, in rats of the experimental group, under the influence of DENAS, in contrast to the control group, the concentration of glucose and glycosylated hemoglobin was reduced, which was reflected in the appearance of a "weak" positive relationship with the correlation coefficient $r = 0.4$ ($p < 0.05$) and the relationship between these indicators in the control group is "weak" feedback $r = -0.41$. It can be said that dynamic electroneurostimulation inhibits the non-enzymatic reaction of the formation of glycosylated hemoglobin from

hemoglobin and blood glucose, while reducing the level of glucose. The level of 11-ACS in the experimental group was 144.82 ± 12.6 µg / l, in the control group 578.93 ± 83.9 µg / l ($P < 0.05$). Perhaps this fact is related to the peculiarities of the implementation of the stress reaction in rats of the control group against the background of an increase in the concentration of glucose and glycosylated hemoglobin in the blood. Correlation analysis of glucose and 11-ACS in the blood of the control group confirms the existence of a connection between these components, the correlation coefficient was 0.51 ($p < 0.05$), that is, there was a "strong" positive relationship in the rats of the control group, while the relationship between these indicators in the experimental group "weak", the correlation coefficient was -0.12 ($p < 0.05$). With normoglycemia up to 5.5 mmol / l, the connection with 11-ACS is low, it increases in proportion to the degree of hyperglycemia, proving the contribution of hyperglycemia above 9.2 mmol / l to activation of oxidative stress. In experimental hyperglycemia, an increase in the liver of TBA-active products was noted in rats of the control group to 4.5 ± 0.54 mmol / ml ($p < 0.05$) (in intact 3.0 ± 0.17 mmol / ml), while the content of TBA-active products in rats of the experimental group in the liver was reduced to 1.5 ± 0.17 mmol / ml ($p < 0.05$).

It is noteworthy that the antioxidant defense activity is higher in the liver in rats of the experimental group, where the content of catalase was 843.7 ± 25.4 mmol / min, in the control group, catalase in the liver was 358.6 ± 39.4 mmol / min ($p < 0.05$).

Conclusion: The development of oxidative stress, initiated by the introduction of alloxan, against the background of an increase in the concentration of glucose and glycosylated hemoglobin in the blood, is accompanied by a change in the activity of the body's antioxidant defense enzymes. An increase in lipid peroxidation is one of the indicative markers and components of the development of a stress reaction. The results prove the development of oxidative stress in rats of the control group.

Considering the effect of dynamic electroneurostimulation on experimental animals with alloxan-induced diabetes under conditions of chronic immobilization stress, it can be concluded that electroneurostimulation reduces carbohydrate metabolism (glucose, glycosylated hemoglobin), reduces the activity of lipid peroxidation, thereby increasing the body's antioxidant defense system. These results indicate the ability of dynamic electroneurostimulation to have a protective effect in the development of pathologies associated with oxidative stress. Given that DENAS reduces the level of metabolic changes on the background of hyperglycemia, it can be recommended as a means of pathogenetic treatment to enhance the basic therapy of hypoglycemic agents, in order to reduce the likelihood of early complications.

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概述森林带和哈卡斯草原的小型哺乳动物
OVERVIEW OF THE SMALL MAMMALS OF THE FOREST-BELT AND STEPPE OF KHAKASSIA

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抽象。考虑了哈卡斯共和国草原景观中啮齿动物和食虫动物的小型哺乳动物的生物多样性问题。在过去的一个世纪里，哈卡斯地区的草原大范围因人类活动而发生了重大变化。主要草原中出现了林带系统。在这些地区形成了一种特殊的脊椎动物群，其中包括附近的草原，森林草原和森林生物群落的小型哺乳动物物种。研究人类转化地区动物群的组成具有理论和实际意义。研究了来自Shirinsk和Koybal草原不同地点的小型哺乳动物的种群。分析了啮齿动物和食虫哺乳动物的物种组成和丰度。人工林带在草原中发挥着重要的生态功能，因为它们集中了不同类型的脊椎动物，有助于保护生物多样性并提高生态系统的生产力。

关键词：小型哺乳动物，人工带，啮齿动物，sh ,,草原，哈卡斯共和国。

Abstract. The problems of biological diversity of small mammals from the orders Rodents and Insectivorous in the steppe landscape of the Republic of Khakassia are considered. Over the past century, the steppe expanses of the Khakassia region have been significantly transformed by human activity. A system of forest belts appeared among the primary steppes. A peculiar vertebrate fauna is formed in such areas, which includes species of small mammals of nearby biotopes of steppes, forest-steppes and forests. The study of the composition of the fauna of anthropogenically transformed territories is of theoretical and practical interest. Populations of small mammals from different sites of the Shirinsk and Koybal steppes were studied. The species composition and abundance of rodents and insectivorous mammals are analyzed. Artificial forest belts perform an important ecological function among the steppes, because they concentrate different types of vertebrate animals, which contribute to the preservation of biodiversity and improve the productivity of the ecosystem.

Key words: small mammals, artificial belts, rodents, shrew, steppes, the Republic of Khakassia.

The steppe landscape of Khakassia as a result of human activity over the past centuries has been significantly transformed, a system of protective artificial forest belts has been created, which changed the faunal composition of small mammal communities of indigenous steppe. Artificial forest belts in the Khakassia's steppe landscape are diverse in composition of tree and shrub species, structure and planting methods, and also have different purpose (shelter protection, pasture protection, slope, forest stands along irrigation main canals). The studies were carried out in the Shirinskaya (Chulymo -Yenisei kettle) and Koibalskaya (South Minusinskaya depression) steppes of Khakassia from 2000 to the present.

Materials and methods: The steppe landscape of Khakassia and its vertebrate animals inhabit has a peculiar specificity, due to the peculiarities of natural climatic conditions and relief. The study of the composition of the fauna of mammals (including rodents and insectivores) in forest-agrarian landscapes is of great theoretical and practical interest. Artificial forest belts attract the attention of zoologists due to the fact that zoocenoses are forming here from forest species and representatives of open spaces.

In the Shira Steppe studies conducted in shelter belts, growing on sandy soils and chernozem southern srednesuglinistyh black earth, which consisted of the following species: Siberian larch, poplar black, pea shrub Bunge, sea buckthorn, golden currant, and also examined the forb-grass and hairy-saline steppes. In the Coibal steppe, plantings along the irrigation main canal and forest belts with a shelter role have been studied. The forest belts included the following tree and shrub species: squat elm, hybrid poplar, Siberian larch, sea buckthorn, golden currant, apple tree. A plot of forb-grass steppe was studied.

The studies used generally accepted zoological methods of quantitative trapping and accounting of small mammals, for relative accounting methods of trapping in the Gero traps, as well as grooves and fences with cones were used. Extracted animals were treated according to standard zoological methods [3, 4, 5].

The result of research: As a result of research, 20,250 trap-days and 5,500 cone-days (c.-s.) were worked out, 2,256 animals were collected, belonging to 17 species of which 11 species of the Rodent detachment (Rodentia Bowdich, 1821) and 6 species of the Insectivorous detachment (1821).

Small shrew (*Sorex minutus* Linnaeus, 1766). In Khakassia, the distribution of the species has been studied very poorly, since until 1953 it was not known to researchers [2]. It was procured by N.A. Kokhanovsky in 1957 in the clearings and river valleys in the Beisk and Askizka districts. N.N. Balagura indicates the presence of the species in the Kolkovo forests, in the flood plain of the White Iyus, heterogeneous and poplar forest belts of Khakassia (1987) [1]. Studies conducted by us in Khakassia indicate that the small shrew lives in artificial forest plantations and in the open Shirinsk steppe. It inhabits different types of forest belts, does not

reach high numbers, and on average is 2 individuals per 100 c.-s. The presence of the species was also found in the hairy-saline and forb-grass steppes.

Within the Koybal steppe, this species is also not numerous (no more than 2 individuals per 100 c.-s.).

Medium shrew (*Sorex caecutiens* Laxmann, 1788). In Khakassia N.A. Kokhanovsky (1962) caught the middle shrew in coniferous stands, and N.N. Balagura (1987) - in the floodplain of White Iyus. Our studies indicate the absence of this species in protective forest belts and steppe phytocenoses within the Shira steppe. This shrew avoids steppe areas, poorly populates artificial protective afforestation. In the Coibal steppe, the shrew was registered singly in August 2005 in a planting of poplar hybrid, elm squat and golden currant.

Plano-cranial shrew (*Sorex roboratus* Hollister, 1913) In distribution, the species is associated with dark coniferous taiga and forests of the East Siberian type, avoids steppe and steppe areas [10]. This shrew is marked by us only in the Coibal steppe, where it was caught in artificial stands from hybrid poplar with sea buckthorn, elm-tree, golden currant.

Common shrew (*Sorex araneus* L., 1758). The common shrew is the most abundant species of the genus Sorex in almost its entire range. The species is distributed throughout Khakassia very widely inhabits various biotopes (forest belts, overgrown shrubs, gullies, forests, flood plains). For the first time in the territory of Khakassia, the common shrew was captured in 1928. N.M. Dukla (1930) in Askiz and Beisk districts, in the vicinity of the lake Shira [1; 2]. It was noted by us in all artificial forest stands and in the hairy-saline, herb-grass and wormwood steppes.

In the Coibal steppe, the species is registered during the entire study period. It inhabits forest belts of all types. In the steppe area on sandy soils, this species is not registered.

Tundra shrew (*Sorex tundrensis* Merriam, 1900). In Khakassia, the species is noted by N.A. Kokhanovsky (1962). Habitats are mainly confined to forest plantations (thickets of bird cherry, willow, and aspen). According to N.N. Balagury (1987), the tundra shrew inhabits the birch-larch, poplar and other artificial forest plantations of Khakassia.

In the Shirinskaya steppe inhabits forest belts of Siberian larch with sea buckthorn and larch with tree karagana. In other forest belts not marked. Within the limits of the steppe areas, the shrew is caught in the Hairy-saline and Wormwood associations.

In the Koybal steppe, the species is exposed to multi-row forest belts with understory.

Tiny shrew (*Sorex minutissimus* Zimmermann, 1780). In Khakassia, a species was discovered by N.A. Kokhanovsky in 1958 in the dark coniferous taiga on the river Tashtyp. The presence of the species in the forest belts is indicated by N.N.

Balagura (1987). The species is distributed throughout Khakassia vary widely, inhabiting all natural areas [2].

In the Shira steppe, the species was noted by us in all periods of research. In the Coibal steppe, a tiny shrew prefers grass-grass formations on sandy soils.

Steppe mouse (*Sicista subtilis* Pallas, 1773). Directly in the steppes of Khakassia steppe mouse caught N.A. Kokhanovsky (1962), and in the forest belts - N.N. Balagura (1987).

In the Koibal steppe, the favorite habitats of the species are the edges of hardened sands with sparse steppe vegetation. In Khakassia, it is common in different parts of the steppes [10].

According to our information, the steppe mouse is common in the Shira steppe in artificial larch-sea buckthorn plantations. It also dwells in the grass-grass and wormwood associations of the steppe. In the Hairy-saline steppe is not marked.

Within the limits of the Koybal steppe, the steppe mouse was caught in planting of different species composition.

Analyzing the temporal distribution of the species in the composition of artificial forest phytocenoses, we trace the non-permanent presence of the steppe mouse in the composition of small mammalian communities. In general, for the steppe zone of Khakassia, the steppe mouse is considered a common species.

Djungarian hamster (*Phodopus sungorus* Pallas, 1773). Habitats: virgin steppe areas, abandoned arable land, fields, vegetable gardens, fixed sands, steppe lakes, river valleys, islands [2].

In the Khakass southern steppes, hamster was caught by M.K. Serebrennikov (1929), M. D. Zverev (1930). N. A. Kokhanovsky (1962) noted this species for valleys and islands p. Abakan, Yenisei, Chulym, near the city of Chernogorsk, at the Belyo and Sorokoozeroks lakes, in forest belts along the irrigation canals of Askiz and Ust-Abakan regions. In the poplar forest belts different in their composition, this species was in an insignificant number [1].

In the Shirinskaya steppe and forest belts, the Dzungarian hamster was found in the forest belt of Siberian larch with sea buckthorn; in 2015 it was caught on abandoned arable land between the forest belts.

Earlier, we noted in wormwood, forb-grass and in the Hairy-saline steppe [6; 7; eight].

This species does not inhabit the forest belts of the Koybal steppe; it was caught by us only in the steppe plant communities.

Steppe pestle (*Lagurus lagurus* Pallas, 1773). The steppe pestle inhabits the entire steppe zone and on the outskirts of the forest-steppe, inhabits virgin lands, crops of field and garden crops, boundaries, shelter belts, coast of salt lakes [2]. N.N. Balagura (1987) indicates the presence of the species in different by species composition of forest belts.

In the Shirinskaya steppe, the species was recorded in all studied types of forest shelter belts and steppe areas; in 2001, its abundance reached 27 individuals per 100 c.-s. This year was characterized by a "outbreak of numbers", which is usually for this species. In other periods of the study, the presence of the species is not marked. In 2016-2018 occurs in trapping but does not reach high rates.

In the Koibalsky steppe and forest belts, the steppe pestle is registered by us in single specimens.

Common Vole. N. A. Kokhanovsky (1962) indicates its distribution in the northern, central part and in the south of Khakassia, mainly in the open landscapes. N.N. Balagura (1987) notes its presence in the forests, which differ in their protective composition of species.

Studies in the Shira steppe of Khakassia, conducted by us, testify to the habitat of the species in all the forest belts and in the open steppe considered by us. In different years, the abundance of the species varies from 1.3 to 4 individuals per 100 c.-s.

In the Koibal steppe, an ordinary vole was encountered by us in artificial forest belts from poplar hybrid, elm squat, Siberian larch, sea buckthorn, golden currant and tree karagana. In biotopes of the primary steppe area, this species is not noted in any of the study periods.

Dark vole (*Microtus agrestis* L., 1761). Within Khakassia, it is known from the materials of M. D. Zverev (1930) and V.N. Scalona (1936). It was registered on the old burns, in the marshy and shrub-laden river valleys in the south by N.A. Kokhanovsky (1962). N.N. Balagura (1987) does not indicate at a dark vole either in the steppes or in protective forest belts. Studies of rodent communities of open steppes and forest belts in the northern part of Khakassia showed that the dark vole was encountered in 2000–2001 in the forest belts of Siberian larch with sea buckthorn, Siberian larch without undergrowth and in black poplar plantations. It is not found in the steppe associations.

In the southern part of Khakassia, within the limits of the Coibal steppe, we have not observed a dark vole.

Narrow-headed vole (*Microtus gregalis* Pallas, 1779). N. A. Kokhanovsky (1962) noted the presence of voles in all landscape zones of Khakassia, including the islands and valleys of the river Abakan and Yenisei, near the lakes Red and Belyo, as well as in the forest belts.

Studies conducted by us indicate that a narrow-craned vole is present in the steppe communities of this group of mammals in the forb – grass and hairy – saline steppes, which are widespread [6, 7; 8]. For the last 4 years of research, the vole occupies a dominant position in biotopes of various types, slightly inferior in the number of field mice. In 2018, in the vicinity of Lake Shira, a high abundance of up to 20 animals per 100 trap-days was noted.

Within the limits of the Koybal steppe, the narrow-craned vole is registered in all the studied artificial plantations and in the steppe communities, however, in different periods of research its share in the communities differs. It is worth noting, however, the fact that in all periods of research in the Koybal steppe (outside the forest belts) this species was dominant and its share amounted to 90% of the total number of animals in zoocenoses.

Red-gray vole (*Clethrionomys rufocanus* Sundevall, 1846). N. A. Kokhanovsky (1962) indicates its presence in taiga habitats, in the pine forests of the south of the republic and in the fields near the village of Shora (Askizsky district). N.N. Balagura (1987) noted her presence in the floodplain of the White Iyus. Studies conducted by us testify to the small number of the species and its presence in the plantation from Siberian larch with Karagana, in other biotopes of the Shira steppe, the species is not marked. In the Koibal steppe in the south of Khakassia, a vole in the forest belts is not encountered.

Red vole (*Clethrionomys rutilus* Pallas, 1779). N. A. Kokhanovsky (1962) indicates its distribution in the bush thickets of river valleys, in spruce and spruce-pine stands, on burns and in the taiga. N.N. Balagura (1987) noted a red vole in the Kolkovo forests, in the flood plain of Bely Yyus, on open from tree stands, overgrown with shrubs, in different types of forest belts. According to B.S. Yudin and his co-authors (1979), the main factors affecting the biotopic distribution of the species are suitable feeding sites, as well as cluttering up areas, providing the necessary protective conditions.

In the biotopes examined by us in the Shirinskaya steppe of Khakassia (in the forest belts), the red vole was observed in the forest belt of Siberian larch with Bunge karagana (2000s). In 2016-2018 its abundance increased in the roadside with karagana it reached 5-7 individuals per 100 hp.

In the southern part of Khakassia, we harvested this vole in plantations from elm, sea buckthorn and currant, and in plantations from poplar hybrid, elm, sea buckthorn and currant.

Tiny Mouse (*Micromys minutus* Pallas, 1771). The communities we studied showed that the tiny mouse inhabits various habitats with high dense grass and steppes with a predominance of grass vegetation. In the years 2000-2007 was present in trapping of various wetted biotopes; over the past few years, it has not been recorded in previous habitats.

In the Koibal steppe, Khakassia prefers the same forest belt with thick and high grass cover and inhabits the forest belt of different structure and composition. In the open steppe areas, its share in the community varies from year to year (from 0 to 4 individuals per 100 c.-s.), which is explained by the least suitable conditions for the habitat of this species, in comparison with artificial forest plantations.

Field mouse (*Apodemus agrarius* Pallas, 1771). Studies conducted by us showed a wide biotopic distribution of the species within Khakassia. In the forb-grass, hair-saline and wormwood associations of the Shira steppe, this species was

constantly included in small mammals communities. In the Shirinsk and Koibal steppes of Khakassia, this species was caught during all periods of research in artificial protective forests. In recent years, the species is the absolute dominant in the steppe biotopes, amounting to from 3 to 7 animals per 100 hp.

East Asian mouse (*Apodemus peninsulae* Thomas, 1907). N. A. Kokhanovsky (1962) indicates the presence of the animal in the forest-steppe of the southern part of Khakassia. N.N. Balagura (1987) caught it in the prickly forests, as well as in poplar and mixed forest belts.

Our studies in the northern part of Khakassia revealed the presence of an East Asian mouse in different plantations, in 2017-2018. in the roadside cluttered forest belts reached 6 osba per 100 hp. In the steppe, an East Asian mouse is not registered. In the southern part of Khakassia (Koibalsky steppe) its presence was not detected.

Conclusion: Populations of small mammals from different sites of the Shirinsk and Koybal steppes were studied. The species composition and abundance of rodents and insectivorous mammals are analyzed. Artificial forest belts perform an important ecological function among the steppes, because they concentrate various types of vertebrate animals, which contribute to the preservation of biodiversity and improve the productivity of the steppe ecosystem. In the last decade, shrinking and cutting down of forest belts have occurred, some have already died from fires. In this regard, the phyto-and zoocenoses are degraded in many parts of the steppe biotopes. Biodiversity indicators are reduced; the numerical abundance of many small mammals is at a critical level. A number of activities should be developed to help preserve the unique animal communities in the steppe landscape of Khakassia.

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磷酸盐污泥对加工后土壤污染的影响
EFFECT OF PHOSPHATE BATH SLUDGE ON SOIL POLLUTION AFTER PROCESSING

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注解。 本文研究了原始和再生磷酸盐污泥的乙酸铵提取物的元素组成对土壤污染的影响。 加工磷酸盐污泥产品中流动形式的化学元素含量比原污泥少28倍，优先元素的相应浓度比降低1000倍以上。
关键词：磷化污泥，铁素体化，乙酸铵提取物，浓缩比，克拉克，优先要素。

Annotation. *The article examines the effect of the elemental composition of ammonium acetate extract of the original and recycled phosphate sludge on soil contamination. The content of chemical elements in the mobile form in the product of processing phosphate sludge is 28 times less than in the original sludge, and the corresponding concentration ratio for priority elements is lowered by more than 1000 times.*

Keywords*: phosphatization sludge, ferritization, ammonia acetate extract, concentration ratio, clarke, priority elements.*

The precipitation of phosphatizing electroplating baths is a product of a multi-step process using a range of reagents, which makes the phosphatizing sludge (PS) unsafe for the environment due to the multicomponent composition, including also heavy metal compounds (HM). The processing of PS for the purpose of its neutralization should be based on knowledge of the content in the mobile form of chemical elements of both the initial PS and the product of its processing. Taking into account the presence of phosphate and HM in PS, it can be assumed that the treatment of PS with iron (II) sulfate solution in an alkaline medium at t = 80° C

should lead to a decrease in the content of phosphate and HM in the sludge in a mobile form. Such a process, partly corresponding to low-temperature ferritization [2, p. 88], was used in the present work.

The work consisted of implementation of the following stages:

1. Obtaining ammonia-acetate extract (AAE) from the original PS.

2. Ferritization of phosphate sludge.

3. Washing of freshly prepared "ferritized" PS (PSF) with deionized water and obtaining a wash liquid for analysis.

4. Getting solid PSF.

5. Getting ammonia-acetate extract from the original PSF.

6. Quantitative chemical analysis of the AAE of the original PS, PSF and filtrate of the washing liquid.

The mass concentration of 24 chemical elements in ammonium acetate extracts and the filtrate of the washing liquid was measured by atomic emission spectroscopy on an optical emission spectrometer with an inductively coupled plasma "Agilent 720" [3, p.46] (measurement error for low concentrations: ± 25%).

The presence of elements in the mobile form in the sludge phosphating (ωAAE (PS)), in freshly prepared ferritized phosphate sludge (by washing, ωWASH (PSF)), and dried ferritized phosphating sludge (ωAAE (PSF)), was calculated by these formulas:

$$\omega_{AAE}(ШФ) = C_{AAE}(ШФ) \cdot V_{AAE1}/m_{AAE}(ШФ) \qquad (1)$$

$$\omega_{WASH}(ФШФ) = C_{WASH}(ФШФ) \cdot V_{WASH}/m_{WASH} \qquad (2)$$

$$\omega_{AAE}(ФШФ) = C_{AAE}(ФШФ) \cdot V_{AAE2}/m_{AAE}(ФШФ) \qquad (3)$$

if $C_{AAE}(PS)$, $C_{WASH}(PSF)$, $C_{AAE}(PSF)$ – mass concentration of the chemical element (mg / dm3) in AAE PS, in wash water and in AAE PSF, respectively; V_{AAE1}, V_{AAE2}, V_{WASH} – volume of water (dm3) for the preparation of AAE PS and PSF, for washing PSF, respectively; $m_{AAE}(PS)$, $m_{AAE}(PSF$, m_{WASH} – mass (kg) of PS, PSF, taken to prepare AAE, and freshly prepared PS, washed on the filter.

Values $\omega_{AAE}(PS)$, $\omega_{WASH}(PSF)$ и $\omega_{AAE}(PSF)$ are shown in table 1.

Content sums of elements $\Sigma_{25}\omega$, $\Sigma^*\omega$ and $\Sigma_6\omega$ for all three aquatic environments by the example of AAE PS calculated by the equations:

the sum of all 25 elements

$$\Sigma\omega = \Sigma(\omega_{AAE}(PS)), \qquad (4)$$

the sum of all the elements, except those for which the mass concentration in the AAE is less than the detection limit

$$\Sigma^*\omega = \Sigma^*(\omega_{AAE}(PS)), \qquad (5)$$

the sum of the presence of all six priority elements

$$\Sigma^6\omega = \Sigma^6(\omega_{AAE}(PS)). \qquad (6)$$

<div align="right">*Table 1*</div>

The presence of elements in a mobile form in the sludge phosphating ωAAE (PS) (determined by the emission of compounds of elements in the ammonium acetate extract), in freshly prepared ferritization of the phosphate sludge product ωWASH (PSF) (determined by the content of elements in the wash water PSF), the processed product of ferritization of phosphate sludge ωAAE (PSF), (determined by the content of elements in the ammonia-ammonium extract of PSF), clark of the chemical element for urban soils of CGP half-million cities.

	Element	Ω_{AAE} (PS), mg/kg	Ω_{WASH}(PSF), mg/kg	Ω_{AAE} (PSF), mg/kg	Kgp, mg/kg
1	2	3	4	5	6
1	Al	7,25	5,7	0,96	37360
2	Ba	0,18	<0,0003	<0,0003	1091,4
3	Be	< 0,0001	<0,0001	<0,0001	2,8
4	Cd	< 0,0005	<0,0005	<0,0005	0,8
5	Co	9,73	0,25	<0,002	14,4
6	Cr	243	<0,0015	0,386	55
7	Cu	1444	9,58	2,63	30,1
8	Fe	127	283	160	20110
9	Mn	22,2	5,78	16,2	715,2
10	Mo	2527	16,3	0,005	2,2
11	Ni	19,3	5,88	2,05	28
12	Pb	< 0,008	<0,008	<0,008	45,6
13	Sb	1,22	0,34	0,015	1
14	Se	4,49	0,57	0,02	10,1
15	Si	4165	130,17	3,33	261200
16	Sr	12,4	<0,0001	0,921	359,2
17	Ti	< 0,001	<0,001	<0,001	4378,2
18	V	< 0,002	<0,002	<0,002	78,9
19	Zn	4570	84,5	92	115,8
20	Ca	2718	57,8	185	77090
21	B	55	41	2,01	45
22	Mg	172	11,31	122	10100
23	Ag	< 0,003	<0,003	<0,003	0,4
24	Tl	< 0,015	-	<0,015	1
25	As	<0,01	<0,01	<0,01	10
$\Sigma_{25}\omega$		16098	652	588	
$\Sigma^*\omega$		16098	652	588	
$\Sigma_6\omega$		15667	613	579	
N(<NPO)		8	10	11	

The concentration coefficients of the elements in the rolling form by the clarke for the soils of half-million cities in the phosphatizing sludge KAAE (PS), in freshly prepared ferritization product of phosphate sludge K_{WASH} (PSF), in the processed ferritization product of phosphate sludge ω_{AAE} (PSF).

№	Element	K_{AAE} (PS)	K_{WASH}(PSF)	K_{AAE} (PSF)
1	2	3	4	5
1	Al	0,00019	0,00015	0,000026
2	Ba	0,00016	< 0,00000027	< 0,00000027
3	Be	< 0,000036	< 0,000036	< 0,000036
4	Cd	< 0,00063	< 0,00063	< 0,00063
5	Co	0,68	0,017	< 0,00014
6	Cr	4,42	< 0,000027	0,0070
7	Cu	48,0	0,32	0,087
8	Fe	0,0063	0,014	0,0080
9	Mn	0,031	0,0081	0,023
10	Mo	1149	7,41	0,0023
11	Ni	0,69	0,21	0,073
12	Pb	< 0,00018	< 0,00018	< 0,00018
13	Sb	1,22	0,34	0,015
14	Se	0,44	0,056	< 0,0020
15	Si	0,016	0,0005	0,000013
16	Sr	0,035	< 0,00000027	0,0026
17	Ti	< 0,00000023	< 0,00000023	< 0,00000023
18	V	< 0,000025	< 0,000025	< 0,000025
19	Zn	39,5	0,73	0,79
20	Ca	0,035	0,00075	0,0024
21	B	1,22	0,91	0,045
22	Mg	0,017	0,0011	0,012
23	Ag	< 0,0075	< 0,0075	< 0,0075
24	Tl	< 0,015	-	< 0,015
25	As	< 0,001	< 0,001	< 0,001
$\Sigma_{25}K$		1244,9	10,0	1,10
$\Sigma^* K$		1244,9	10,0	1,07
$\Sigma_6 K$		1242,9	9,7	1,04
N(K >1)		6	1	0

The mass fraction of mobile chemical elements in the sludge in all amounts as a result of processing the PS decreases by 28 times (Fig. 1), which corresponds to an increase in the number of elements with a content in the aqueous phase that is below the lower detection limit (N<NPO) from 8 to 11 out of 25 corresponding extracts found in the filtrate.

When placing such FFs in places of temporary or permanent storage, soil contamination is possible. To assess the level of such pollution as the standard data taken clark K_{gp} (table.1) chemical elements for the soil cover of half-million cities [1, p.28].

The concentration ratios, showing the multiplicity of excess of the clarke of the chemical element, were calculated by these formulas:

$$K_{AAE}(PS) = \omega_{AAE}(PS)/K_{gp}, \tag{7}$$

$$K_{WASH}(PSF) = \omega_{WASH}(PSF)/Kgp, \tag{8}$$

$$K_{AAE}(PSF) = \omega_{AAE}(PSF)/Kgp. \tag{9}$$
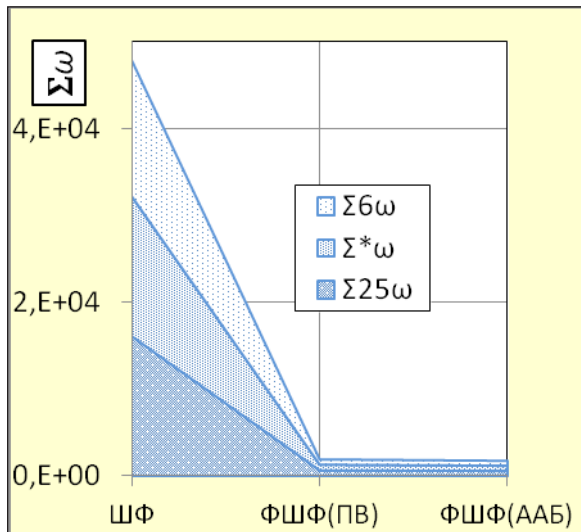
Fig. 1. *The change in the amount of the content of the elements in the moving form atthe transition from phosphate sludge (PS) to ferritized phosphate sludge at the stage of washing with PSF (PV) and the stage of productionammonium acetate extract (PSF (AAE))*
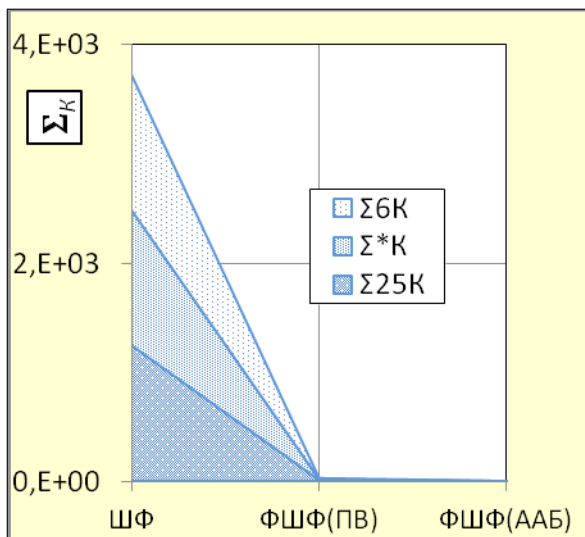
Fig. 2. *The sum of the coefficients of concentration of elements in a moving form relative to the clarke for sludgephosphating (PF), ferritized phosphating sludge at the stage of washing with PSF (PV) and the stage of obtaining ammonium acetate extract (PSF (AAE))*

The values of concentration factors are given in the table 2.

The sum of the concentration factors $\Sigma_{25}K$, Σ^*K и Σ_6K (table.2) for all three aquatic environments by the example of AAE PS are calculated by the equations: the sum of the presence of all 25 elements

$$\Sigma_{25}K = \Sigma_{25}(K_{AAE}(PS)), \tag{10}$$

the sum of the presence of elements except those for which the mass concentration in the AAE is less than the detection limit

$$\Sigma^*K = \Sigma^*(K_{AAE}(PS)), \tag{11}$$

the sum of the presence of all six priority elements

$$\Sigma^6K = \Sigma^6(K_{AAE}(PS)). \tag{12}$$

If for the original PS the number of chemical elements exceeding the clarke (Mo, Cu, Zn, Cr, B, Sb) equal to six (table.6), then there are no such elements in the PSF. The values $\Sigma_{25}K$, Σ^*K и Σ_6K decreased by $1100 \div 1200$ times (Fig.2).

These results indicate the effectiveness of the proposed method of disposal of phosphate sludge.

When the chemical elements are arranged in order of decreasing the value of the KAAE (PS) value taken on a logarithmic scale, we obtain a series of priority of chemical elements as polluting the soil with phosphating sludge, which is demonstrated by the diagram in Fig.3.
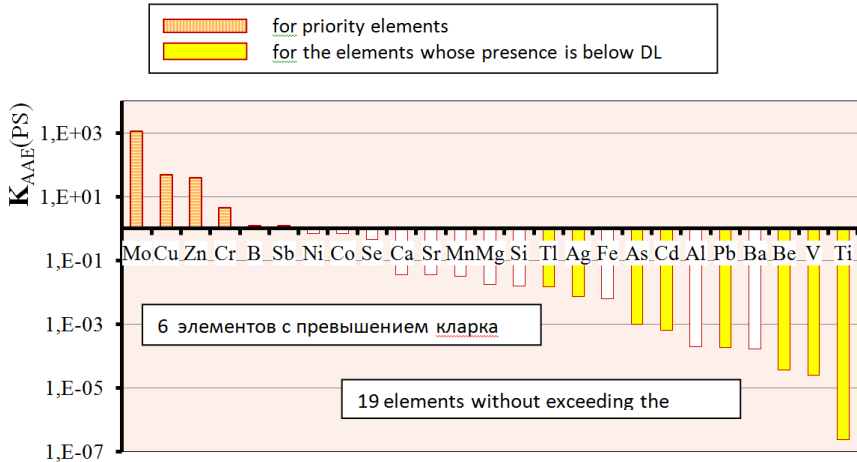
*P **Fig. 3.** A number of priority elements in the ammonium acetate extract of the original phosphate sludge in order of decreasing value concentration ratio K_{AAE} (PS)*

The line with K_{AAE} (PS) = 1 is a demarcation line, above which are the values of the concentration coefficient for the priority elements (Mo, Cu, Zn, Cr, B, Sb) polluting the soil, and below (K_{AAE} (PS) < 1) – for relatively "Safe" for soil cover of sludge elements. The colored bars, which are below the dividing line, correspond to elements with a presence in the aqueous extract below the lower detection limit. For this reason, the corresponding values $\omega_{AAE}(PS)$ (table.1) and $K_{AAE}(PS)$ (table.2) are lower than those shown in the tables, and the eight colored downward bars in Figure 3 may have even smaller values K_{AAE} (PS), which, however, has virtually no effect on the value of the amounts in Tables 1 and 2 and the corresponding conclusions due to the fact that for these elements K_{AAE} (PS) << 1. The increased presence of molybdenum in PS and its priority in soil contamination can be explained by the addition to PS of products formed during the molybdenum metal surfaces in the area close to the phosphatization site.

A number of priority elements for PSF according to the results of the analysis of wash water is shown in Fig.4. Here the clarke is exceeded by one element - molybdenum.
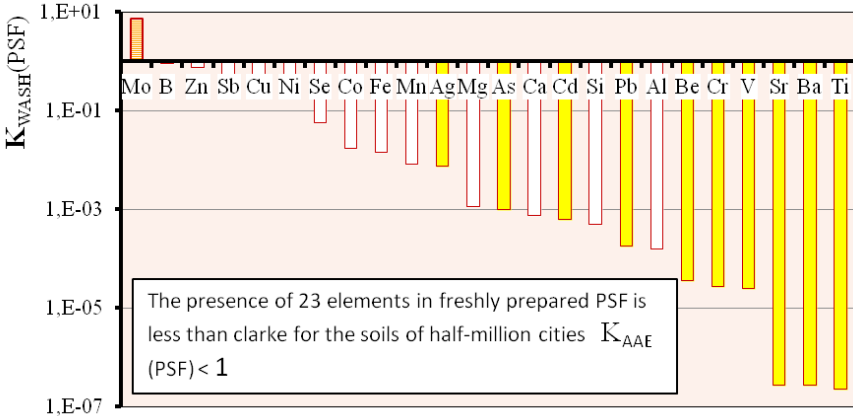
Fig. 4. *A number of priority elements in the washings of freshly prepared ferritized phosphatizing sludge in order of decreasing the value of the concentration ratio **K_{AAE}**(PSF).*
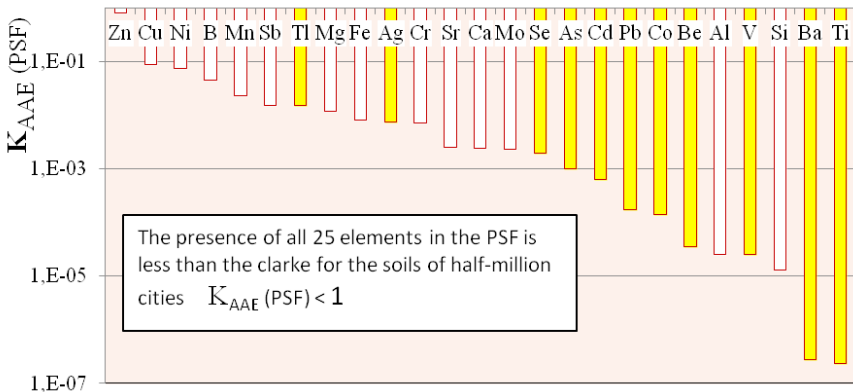
Fig. 5. *A number of priority elements in the ammonium acetate extract of ferritized phosphate sludge in order of decreasing value of the concentration coefficient of clarke **K_{AAE}**(PSF).*

Figure 5 shows a number of priority elements for the final product of the processing of PS according to the results of the analysis of ammonium acetate extract of dried PSF after washing. In this case, for any element in the sludge there is no excess of clarke.

Conclusion

The processing of phosphate sludge reduces the presence of potentially polluting elements by mass in mobile form by 28 times, by the sum of concentration factors of 25 elements relative to the clarke for the soils of half-million cities - by 1,100 polluting elements and by the sum of concentration factors of 6 priority elements - by 1200 times. Recycling PS in the presence of ferrous sulfate (P) is an effective means of reducing the risk of soil pollution.

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振动微型发电机电磁场的微分特性计算
CALCULATION DIFFERENTIAL CHARACTERISTICS OF ELECTROMAGNETIC FIELD IN THE VIBRATION MICROGENERATOR

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注解。 本文介绍了电场和磁场参数的计算 – 电位，场强，电荷密度，电动力，以及积分参数 – 电荷，电容和电感等振动微型发电机，作为自主的一部分。 低功耗消费者供电系统的有限元方法。 场强分量的计算在属于几个元素的节点中以及在元素的公共侧上执行。 已经确定，通过三角形元件内部电势的线性插值，强度值在任何元件内保持恒定和不同。

关键词：电动过程，强度，磁场，计算单元，节点，离散化

Annotation. *The article presents the calculation of the parameters of electric and magnetic fields - potential, field strength, charge density, electrodynamic forces, as well as integral parameters - charges, capacitance and inductance of bodies, etc. vibration microgenerator, functioning as part of an autonomous power supply system for low-power consumers by the finite element method. The calculation of the field strength components is carried out in the nodes belonging to several elements, as well as on the common sides of the elements. It has been established that with linear interpolation of the potential inside triangular elements, the strength values are kept constant and different within any of the elements.*

Keywords: electrodynamic processes, intensity, magnetic field, computational element, node, discretization

The conversion of electromechanical energy in a vibrating microgenerator occurs as a result of electrodynamic processes, and therefore it is necessary to conduct a rigorous study of the motion of charged material bodies in electromagnetic fields. The problems of electrical engineering put forward by practice cannot be solved without the use of a computer for a long time, which entails a modification of the methods for

calculating the electromagnetic field, electric and magnetic circuits. For this reason, the development of new methods for calculating electromagnetic fields, focused on the implementation on a computer, is becoming more valuable. Such methods have been developing effectively in recent years, and with the complication of computers themselves, the methods of numerical calculations of the fields also change [1-3].

In calculating electric and magnetic fields, it is of interest to determine not only the potential, but also the field strength (E, H) and related characteristics such as the charge density of electrodynamic forces acting on charged ferromagnetic bodies, conductors with currents, as well as integral parameters (total charges, capacitance and inductance of bodies, etc.). Since potentials (u, A) are taken as nodal variables, additional operations of the form $E = -gradu$; $H = -gradu$; $B = rotA$ must be performed to calculate the field strength.

The components of the field strength are expressed in terms of the calculated nodal potentials and basis functions of the elements. Because, then $E_x = -\sum_i u_i \dfrac{\partial \varphi_i}{\partial x}$;

$$E_y = -\sum_i u_i \frac{\partial \varphi_i}{\partial y} \; ; \; u = \sum_i u_i \varphi_i \; ; \; E_z = -\sum_i u_i \frac{\partial \varphi_i}{\partial z} \; .$$

To determine the field strength, you can use the coefficients α_{mnp} found in the formation of a system of algebraic equations or the basis functions $\varphi_1, \varphi_{2,...}, \varphi_p$.

The calculation of the field strength components in the nodes belonging to several elements, as well as on the common sides (edges) of the elements has some peculiarities. With a linear interpolation of the potential inside the triangular elements, the strength values are kept constant and different within any of the elements. Therefore, in the nodes (see Fig. 1) the components E_x, E_y are not defined.
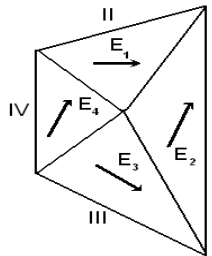
Fig.1 *Calculation element*

The simplest way to calculate them in nodes is to average the components E_x, E_y over elements *I – IV*, which have a common node. On the common side *ad* elements *I, II* (see Fig.2), the potential has the same value, since the interpolation polynomials of both elements have the same order and the potentials of the nodes lying on the common side coincide.
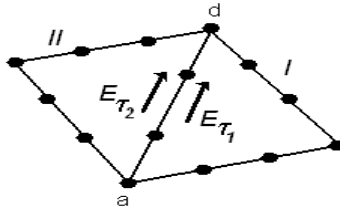
Fig. 2. *Calculation elements with a common node*

Therefore, the components of the field strength are tangent to the common side. However, the normal components of E_n, calculated on both sides of *ad*, are different, unless polynomials of a special type are used [4,5]. Therefore, in the general case, the components E_x, E_y are discontinuous on the common sides of the elements. Therefore, to determine E on the common sides of elements in the case of a homogeneous medium in the simplest case, normal E_n components are averaged.

Such a calculation of the field strength is simple, since the already calculated coefficients of the interpolating potential of the polynomial are used. However, at a low polynomial order, the calculation error depending on its order may become unacceptable. Another method of calculation is based on building a single interpolation polynomial of the potential of several elements using the found nodal values of the potential of these elements. If, in the totality of elements of a triangular shape, having a common node 5 (see Fig. 3), there are six nodes, then there is a polynomial of the form $u(x, y) = \alpha_0 + \alpha_1 x + \alpha_2 y + \alpha_3 xy + \alpha_4 x_2 + \alpha_5 y^2$.
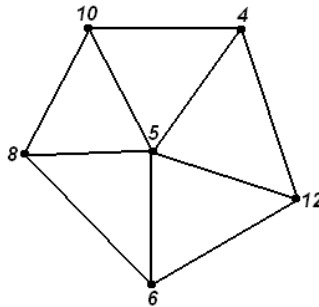
Fig. 3 *The set of elements of a triangular shape*

Using the calculated values of the potentials of the nodes, it is possible, by solving the system of equations $X\alpha = u$ of the sixth order, to determine the coefficients $\alpha_0 - \alpha_5$ and the functions $E_x = -\alpha_1 - \alpha_3 y - 2\alpha_4 x$; $E_y = -\alpha_2 - \alpha_3 x - 2\alpha_5 y$.

With this approach, the accuracy of the field strength calculation increases and becomes acceptable even with linear interpolation of the potential inside the elements.

The accuracy of calculating the derived potentials can be increased not only at the final stage, when the potentials have already been found, but also at the initial one, either by reducing the size of the elements or by increasing the order of the interpolation potential polynomial.

In addition, we can change the formulation of the problem, formulating it with respect to the components of the tension, for example, E_x, E_y or E_r, E_z. In all cases, simultaneously with an increase in the accuracy of the calculation of E, the complexity of the solution increases as the number of variables increases (as the number of elements increases or the solution for E_x, E_y increases) or the solution becomes more complicated (as the order of the interpolation polynomial increases).

The error in calculating the field strength inside the element is determined not only by the order of the interpolation polynomial and the method of its calculation, but also by the type of element [6].

It is undesirable to select elements of a triangular shape with small angles θ at the vertices, since this leads to large errors in the interpolation of the potential and the calculation of the field strength inside the element. If, for example, the desired function has the form $u(x, y) = \alpha y^2$, then with linear interpolation of the potential inside the element, the nodal values of the potential found as a result of a numerical calculation (see Fig. 4) are: $u(0, h/2) = 0{,}25\alpha h^2$; $u(0, -h/2) = 0{,}25\alpha h^2$; $u(\delta, 0) = 0$.

The component of E_x tension inside the element

$$E_x = -\frac{1}{\delta}\left[u(0,0) - u(\delta,0)\right] = \frac{1}{\delta}(0{,}25\alpha h^2 - 0) = \frac{1}{2tg\theta}h.$$
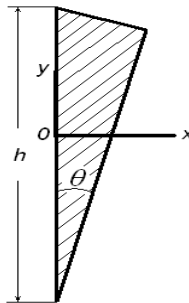

***Fig.4** An example of determining the linear interpolation of the potential inside the calculated element*

However, in reality, due to the independence of the potential from the coordinate $x(u = \alpha_4 y^2)E_x = 0$, so that the error that is numerically equal to the calculated E_x value and has an order of $0(h)$ at small angles θ can significantly increase. Therefore, when sampling an interval, the nodes are tend to be chosen so that the angles of the elements differ as little as possible. At the same time, the lengths of the sides of the element are approximately the same. For the same method of arranging the grid nodes, elements can be selected in different ways (see Fig. 5).
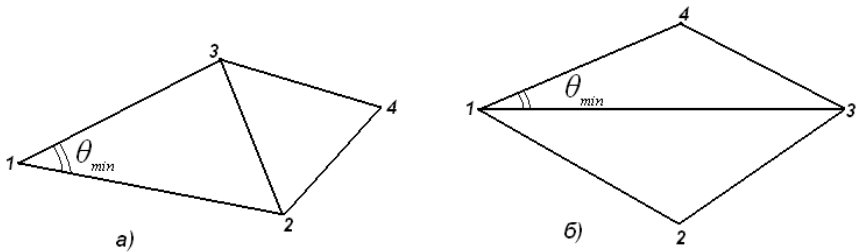
Fig. 5 *Selection of calculated elements for different ways of arranging grid nodes*

To obtain a smaller sampling error and calculate the field strength, it is advisable to select the elements in accordance with Fig. 5a. For a similar reason, it is desirable to arrange the elements in such a way that many elements do not fit the node, since the angle θ is on average $2\pi/n$ (n is the number of elements with a common node) and for large n is small. When performing practical calculations, it is recommended to accept $\theta_{min} \geq 30^0$, that is, no more than 12 elements should fit the node. If the three-dimensional field is calculated [7], then it is necessary to dwell on such a variant of the elements, at which the radius of the sphere inscribed in the element will take the greatest value.

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开发获得具有高胞外多糖活性的益生菌功能产品的模式
DEVELOPMENT OF MODES FOR OBTAINING PROBIOTIC FUNCTIONAL PRODUCTS WITH HIGH EXOPOLYSACCHARIDE ACTIVITY

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注解。主动将水分与益生菌微生物结合的多糖的形成取决于生物质的培养条件，并且对发酵乳益生菌饮料的技术性质，它们的协同作用，益生菌的适应性质的激活，产品的稳定性具有积极影响。存储。本文介绍了益生菌微生物菌群生物量培养模式的实验研究结果，该研究模式确保了多糖合成的高活性，最终产品中结合水分的比例增加。使用差热分析，热重分析和差示扫描量热法在非等温条件下研究发酵益生菌产品中各种形式连接的水分分数。研究了财团生物量的生长模式：№1 – L. casei subsp. rhamnosus, Str。热;第2号 – 植物乳杆菌，嗜酸乳杆菌，发酵乳杆菌，Str。热; No. 3 – B. bifidum, B。adolescentis, B。longum, Str。热; No.4 – L. acidophilus, L.caseisubsp.鼠李糖乳杆菌，植物乳杆菌，发酵乳杆菌，双歧杆菌，青春双歧杆菌，长双歧杆菌，Str。嗜热链球菌，在乳制品中培养时，微生物数量为109CFU／ml，富含抗氧化剂组合物和免疫调节剂。作为对照基质，分析了在用1n盐酸溶液凝固期间类似组成的基质中水分键的形式。基于对实验热成像依赖性的分析，对具有不同结合能的水分的定量评估进行。建立表征样品中水分逐步除去的吸热效应的范围，其对应于将水分结合到基质的生物聚合物凝胶基质的不同形式和能量。获得的结果使我们能够通过调节生物量的培养方案来陈述激活益生菌微生物群的胞外多糖活性的可能性。
关键词：乳酸和双歧杆菌聚生体，胞外多糖活性，生物量培养模式，生物活性添加剂，热重分析，差示扫描量热法，非等温动力学，水分结合形式。

***Annotation.** The formation of polysaccharides that actively bind moisture to probiotic microorganisms depends on the cultivation conditions of biomass and has a positive effect on the technological properties of fermented milk probiotic drinks, their synergies, the activation of the adaptive properties of probiotes, the stability of products during storage. The paper presents the results of an experimental study of the cultivation modes of biomass of probiotic microorganisms consortiums that ensure a high activity of the synthesis of polysaccharides, an increase in the proportion of bound moisture in the final product. The study of moisture fractions of various forms of connection in fermented probiotic products was investigated using the methods of differential thermal analysis, thermogravimetry and differential scanning calorimetry in non-isothermal conditions. Investigated the growth modes of the biomass of consortia: № 1 - L. casei subsp. rhamnosus, Str. thermophilus; No. 2 — L. plantarum, L. acidophilus, L. fermentum, Str. thermophilus; No. 3 — B. bifidum, B. adolescentis, B. longum, Str. thermophilus; No. 4 - L. acidophilus, L. casei subsp. rhamnosus, L. plantarum, L. fermentum, B. bifidum, B. adolescentis, B. longum,, Str. thermophilus, with a microbial number of 10^9 CFU/ml when cultured in dairy systems, enriched with an antioxidant composition and immunomodulators. As a control substrate, the forms of the bond of moisture in substrates of similar composition during coagulation with 1n hydrochloric acid solution were analyzed. A quantitative assessment of moisture fractions with different binding energies was carried out on the basis of an analysis of experimental thermographic dependencies. The ranges of endothermic effects, characterizing the stepwise removal of moisture in the samples, are established, which corresponds to different forms and energies of binding the moisture to the biopolymer gel matrix of the substrate. The results obtained allow us to state the possibility of activating the exopolysaccharide activity of consortiums of probiotic microorganisms by regulating the regimes of cultivation of biomass.*

***Keywords:** lacto- and bifidobacteria consortia, exopolysaccharide activity, biomass cultivation modes, biologically active additives, thermogravimetry, differential scanning calorimetry, non-isothermal kinetics, forms of moisture binding.*

The development of products containing probiotic microorganisms and their metabolites is an urgent task at the present stage of development of the technology of food eubiotic products with properties designed to preserve health and improve the quality of life of the population of all age groups, especially for people suffering from microbiome disorders.

Exopolysaccharides (EPS) are attributed to a number of major metabolites of probiotic microflora, performing a number of important functions: biological in relation to microorganisms, biocorrective in relation to a macroorganism, and technological in relation to food systems. Due to the formation of EPS capsules

in lactic acid bacteria, resistance to the adhesion of phage particles increases, the chance of cell lysis by bacteriophages decreases, and resistance to aggressive external factors, such as acidity, temperature, and ultrasound, increases. Synthesis of EPS promotes the intensification of milk fermentation, shortens the time of clot formation, improves the rheological characteristics and texture of the product. EPS stimulate the biosynthesis of bacteria themselves and other microbial metabolites - amino acids, short-chain fatty acids, vitamins, enzymes, perform a barrier function between the cell and the environment [1, 12, 13].

The interest in EPS of lactic acid microorganisms is due to their pronounced biological activity. There is evidence of their anticarcinogenic, antiviral and immunomodulatory properties [5-7].

The prebiotic properties of exopolysaccharides produced by lactic acid bacteria have also been experimentally proven. There is evidence that oligosaccharides resulting from the partial dissimilation of EPS in the gastrointestinal tract act as a nutrient substrate for the indigenous intestinal microflora.

Based on the analysis of scientific data, ensuring the conditions for the maximum synthesis of exopolysaccharides by lactic and bifidobacteria in the process of obtaining probiotic products allows, without the use of thickeners and builders, to significantly improve their technological properties - the formation of a dense homogeneous structure, resistance to syneresis, enhanced storage and simultaneous expansion of the functional and therapeutic spectrum -prophylactic effects of new products on the body [8-10].

Various factors influence the active biomass growth of probiotic microorganisms and the synthesis of exopolysaccharides, and the optimal conditions for the development of bacteria do not always coincide with the conditions of active synthesis of exopolysaccharides, which logically follows from their protective function for the bacterial cell. Deviations from the optimal conditions of cell development stimulate it to more active synthesis of exopolysaccharide capsules, in addition, the composition of the mixture intended for fermentation plays an important role in the activation of the process of synthesis of exopolysaccharides.

An experimental study of the state of moisture in fermented probiotic products was carried out by the method of differential thermal analysis (DTA) using a synchronous thermal analysis device, model STA 449 F3 Jupiter. The methods of thermogravimetry, differential scanning calorimetry and non-isothermal kinetics were used, with the conversion degree α being found. The DTA method allows one to record the thermal effects of physicochemical and structural changes occurring in a product under controlled exposure to high temperature [2-4]. The heating was performed in the temperature range of 30–300°C, the heating rate was 5 K/min, oxidized aluminum crucibles were used, the medium was nitrogen gas, class 5, the sweep gas flow rate was 40 ml/min. A quantitative assessment of the moisture frac-

tions of various forms of bonding was carried out according to experimental data in accordance with the method [3]. The objects under study are fat-free fermented probiotic dairy systems containing consortia No. 1 - L. casei subsp. rhamnosus, Str. thermophilus; No. 2 — L. plantarum, L. acidophilus, L. fermentum, Str. thermophilus; No. 3 — B. bifidum, B. adolescentis, B. longum, Str. thermophilus; No. 4 - L. acidophilus, L. casei subsp., Rhamnosus, L. plantarum, L. fermentum, B. bifidum, B. midoscentis, B. longum,, Str. thermophilus, at a concentration of 10^9 CFU/ml (titratable acidity 80-100 ºT, pH 4.61-4.65). Consortia were thermostated under three different modes: 1 — at a temperature of 38–41 °C (optimum), 10–12 hours, followed by cooling to 4–6 °C; 2 - at 47-48 °C for 5-6 hours, followed by cooling to 38-41 °C, the duration of thermostating is 5-6 hours, followed by cooling to 4-6 °C, 3 - at 30-33 °C, the duration of thermostating is 5-6 hours, followed by heating to 38-41 °C, the duration of 5-6 hours, followed by cooling to 4-6 °C. The cooling rate was 5 deg/h. Served as control samples of casein gel with a pH of 4.62, obtained by the method of acid coagulation of skim milk 1 n hydrochloric acid.

Table 1. *Thermal effects in the process of thermolysis of samples of fermented probiotic products*

№	Product Sample	Temperature range, ΔT, ºC	Enthalpy, J/kg	Sample weight change, %
1	L. casei subsp. rhamnosus, Str. thermophilus, fermentation 1 mode	30-129	1,854	86,43
2	L. casei subsp. rhamnosus, Str. thermophilus, fermentation 2 mode	30-132	1,834	86,33
3	L. casei subsp. rhamnosus, Str. thermophilus, fermentation 3 mode	30-136	1,825	86,27
4	L acidophilus, L. plantarum, L. fermentum, Str. thermophilus, fermentation 1 mode	30-134	1,806	86,15
5	L acidophilus, L. plantarum, L. fermentum, Str. thermophilus, fermentation 2 mode	30-136	1,801	86,00
6	L acidophilus, L. plantarum, L. fermentum, Str. thermophilus, fermentation 3 mode	30-139	1,798	85,91

№	Product Sample	Temperature range, ΔT, ºC	Enthalpy, J/kg	Sample weight change, %
7	B. bifidum, B. longum, B. adolescentis, Str. Thermophilus fermentation 1 mode	30-126	1,775	85,38
8	B. bifidum, B. longum, B. adolescentis, Str. thermophilus, fermentation 2 mode	30-129	1,769	85,23
9	B. bifidum, B. longum, B. adolescentis, Str. thermophilus, fermentation 3 mode	30-136	1,755	85,16
10	Str. thermophilus, L. casei subsp. rhamnosus, L. acidophilus, L. plantarum, L. fermentum, B. bifidum, B. longum, B. adolescentis, fermentation 1 mode	30-143	1,715	87,55
11	Str. thermophilus, L. casei subsp. rhamnosus, L. acidophilus, L. plantarum, L. fermentum, B. bifidum, B. longum, B. adolescentis, fermentation 2 mode	30-149	1,703	87,41
12	Str. thermophilus, L. casei subsp. rhamnosus, L. acidophilus, L. plantarum, L. fermentum, B. bifidum, B. longum, B. adolescentis, fermentation 3 mode	30-154	1,697	87,37
13	Skimmed milk (control)	30-115	1,777	87,69
14	Casein gel (control)	30-109	1,889	92,62

It is established that, in comparison with the optimal conditions, the synthesis of EPS is activated under the conditions of the second fermentation mode - when the temperature deviates to higher values. With the implementation of conditions of mode 3 - the temperature of cultivation of biomass was reduced to a rate less than the tempera-

ture optimum. In this case, in the final product, the temperature range corresponding to the removal of moisture, including bound, increased more actively, and the change in the mass of the sample during heating, on the contrary, decreased. This indicates an increase in the share of bound moisture in the samples, which suggests that in the third mode, the activity of EPS synthesis increases. This pattern is noted for all studied consortia. The strongest consortium was Str. thermophilus, L. casei subsp. rhamnosus, L. acidophilus, L. plantarum, L. fermentum, B. bifidum, B. longum, B. adolescentis.

Thus, the technological parameters of the fermentation of skimmed milk by consortiums of probiotic microorganisms, providing the highest values of the mass of bound moisture, which corresponds to the activation of the exopolysaccharide activity of the consortia under study, are established. Comparison of the data obtained with the characteristics of the original skim milk and gel obtained without the participation of probiotic microorganisms suggests that in the experimental samples the amount of bound moisture is much higher, which confirms the role of microflora metabolites. The calculated values of the physico-chemically bound moisture content were: for the initial milk 4.01%, and for prototypes fermented in conditions 3 modes for consortia No. 1 - 7.19%, No. 2 - 5.72%, No. 3 - 6 , 07%, № 4 - 7.75%, respectively. The largest share of bound moisture is noted in sample No. 4 (consortium Str. Thermophilus, L. casei subsp., L. rhamnosus, L. acidophilus, L. plantarum, L. fermentum, B. bifidum, B. longum, B. adolescentis), during the fermentation in two-stage mode, the first stage of which involves lowering the fermentation temperature to 30-33 °C, with an exposure of 5-6 hours, the second stage - heating to a temperature of 38-40 °C, an exposure of 5-6 hours, followed by cooling to 4-6 °C with a cooling rate of 5 degrees/h.

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改进兔产品生产技术
IMPROVING THE TECHNOLOGY OF PRODUCTION OF RABBIT PRODUCTS

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抽象。提出了合理使用兔子躯干各种解剖部位的研究结果。已经开发出添加兔肉和发芽扁豆的kupaty配方。已经对所提出的kupaty的处方组成进行了数学优化。该研究的对象是加利福尼亚兔子的各种解剖部位，发芽的扁豆和来自兔肉的kupaty，并添加了发芽的扁豆。与猪肉牛肉相比，所得到的kupaty具有高感官特征（味道，气味，外观，质地）。已经证明，引入kupaty配方的兔肉可以增加其营养和生物价值。确定kupaty的消化率 – 通过用发芽的扁豆替代30%的碎肉来确定93%的消化率。
关键词：兔肉，兔肉，兔制品，蔬菜成分，发芽扁豆，功能和工艺性质，配方优化。
Abstract. *The results of research on the rational use of various anatomical sites of the rabbit trunk are presented. The formula of kupaty with the addition of rabbit meat and sprouted lentils has been developed. A mathematical optimization of the prescription composition of the proposed kupaty has been made. The object of the study was the various anatomical sites of the Californian rabbit trunk, germinated lentils, and kupaty from rabbit meat with the addition of germinated lentils. The resulting kupaty are characterized by high organoleptic characteristics (taste, smell, appearance, texture) compared with pig-beef kupaty. It has been proven that rabbit meat introduced into the recipe of kupaty allows increasing their nutritional and biological value. The digestibility of kupaty is determined - 93% with the replacement of 30% minced meat by sprouted lentils.*
Keywords: *rabbit meat, rabbit meat, rabbit products, vegetable components, germinated lentils, functional and technological properties, recipe optimization.*

In the modern world, protein deficiency is a big problem, because without it,

the normal functioning of the human body is impossible. One of the promising and ways to fill the deficit of full-fledged proteins in the diet is the breeding of early-ripening animals, such as rabbits, whose meat is suitable for creating functional products of various orientations, including on the principles of food combinatorics, where plants have established themselves. [1,2,3]

The increase in the production of meat of early animals, the development of new technologies for cutting raw meat and the production of new functional products plays a special role, because allows you to perform government tasks and improve the provision of the population of high-grade protein of domestic production. This is especially relevant in the current economic situation in Russia due to the sanctions of the United States and the European Union.

The purpose of the work: a scientific substantiation of rational ways of using the anatomical sites when cutting the rabbit trunks in the creation of healthy food products.

Objectives of the study:

- to conduct a critical analysis of patent information sources on the problem of obtaining and using rabbit meat in Russia and abroad;

- to offer possible options for expanding the range of semi-finished and sausage products of functional purpose for industrial production and catering.

It is difficult to assess the enormous importance of meat and meat products for the human body, in the first place - they are sources of essential amino acids, polyunsaturated fatty acids, macro- and micronutrients, and even vitamins. For an adult, it is necessary to consume about 35% of complete protein from the entire daily protein portion of the diet. In the year of such a protein, it is necessary to consume at least 15 kg, however, protein deficiency in Russia is about 1 million tons per year. [4]

Looking through the real possibility of reducing the deficit, including through the development of rabbit breeding, we note that 20 amino acids are found in the rabbit meat protein, including all essential, there are no limiting amino acids. Rabbit meat is characterized by high digestibility and fast digestibility in the human gastrointestinal tract. This results from the fact that muscle fibers in it are very thin and in them there is not enough collagen. In this regard, its protein can be absorbed by almost 90%, while, for example, beef protein is absorbed by only 60%. With an increase in the age of the animal, the content of high-grade proteins in rabbit increases and defective proteins decreases. [5,6,7]

In the course of experimental studies, possible options for cutting a rabbit trunk were proposed, improved on the basis of an assessment of the histomorphological, physicochemical, and functional-technological properties of meat in anatomical sites.

Important tasks facing the meat industry workers are the expansion of the ex-

isting and the creation of a new assortment of meat products, including functional and high-quality rabbit meat, while rational cutting of trunks. Consumer demand was taken into account; of interest are whole muscular semi-finished meat products, the production of which requires improvement of cutting methods with maximum and rational use of trunks.

Positive estimates include the presence of valuable fat with a fairly low melting point and a significant proportion of unsaturated fatty acids. In this regard, for industrial processing and public catering systems, we offer cutting schemes with the combined use of all parts of the trunk (Figures 1-2).

The cutting scheme includes: separating the front legs using a direct cutting perpendicular to the spine at the level of the eighth or ninth thoracic vertebra, followed by their departure to a network of catering restaurants for preparing stews; sawing the forelimb along the joint of the radius, received pieces of 40-50 g each, sent for cooling to a temperature of 0-4 ° C and packed in trays with stretch film to prepare stew; the longest back muscle was cut at an angle of 45 ° into pieces 1.5–2 cm thick, then the pieces of pulp were subjected to mechanical tenderizing (beating), forming a rounded shape, and medallions were obtained. The thickness of the semi-finished product as a result of the tenderization was 0.3-0.5 cm; bone was extracted from the hind limb (a deep incision was made on the inside of the thigh along the entire length, so that the bone was visible, then the muscle tissue adjacent to the bone was cut, the bone was cut and removed), a steak was obtained; the remaining neck, trimming, flank, hind limb meat were ground on a 2–3 mm top and used to make "Voronezhsky" meatballs; the ribs were separated from the spinal column with a knife, sawed on both sides to a length of 5 cm, and ribs were prepared for main courses and smoked; in order to prepare a soup set, the ribs were separated from the spinal column with spinous processes and the ends of the ribs no more than 5 cm; Mechanical deboning meat was obtained according to the following scheme: the skeletons were sent to the drum of the installation I1-FOG, into which a 5% salt solution was previously supplied. After 3 hours, the resulting mass was sent to a colloid mill for 30 minutes at a temperature of 6 ° C.

Taking into account the histo-morphological features of rabbit trunks, the technological schemes of cutting for industrial processing and public catering systems have been proposed. The separation of cuts is carried out in the same way as for retail trade (Figure 2).
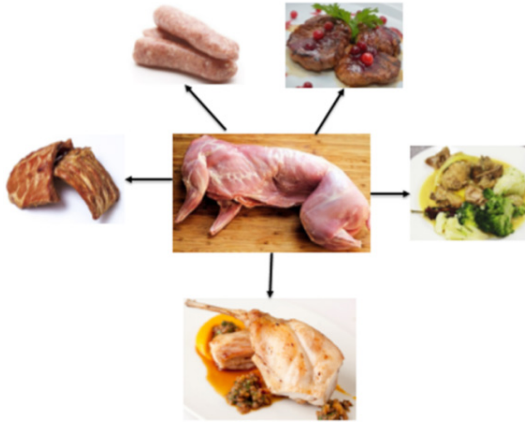
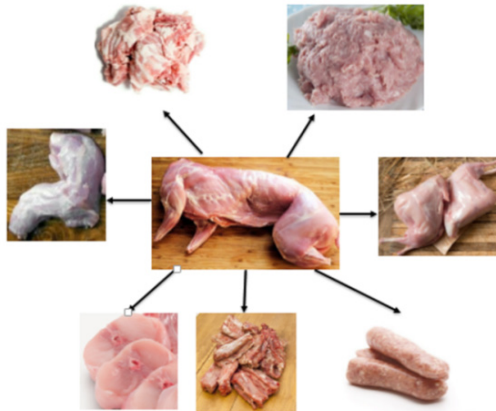*Figure 1 -* *Main dishes of rabbit for catering*

Figure 2 - *Cutting the rabbit trunk for retail*

Looking through the prospects of improving the cutting of rabbit meat in order to make the most complete use of this most valuable raw material, we note that not all sources are assessed in terms of chemical composition and consumer properties. For example, when cutting trunks of rabbits, paws and ears, which can be used as part of food systems, remain unclaimed. With such a cutting, after isolating the anatomical areas for the production of semi-finished products, it is additionally possible to cut the heads and legs (Figure 3).

These raw materials can be used in the preparation of emulsions and original products.
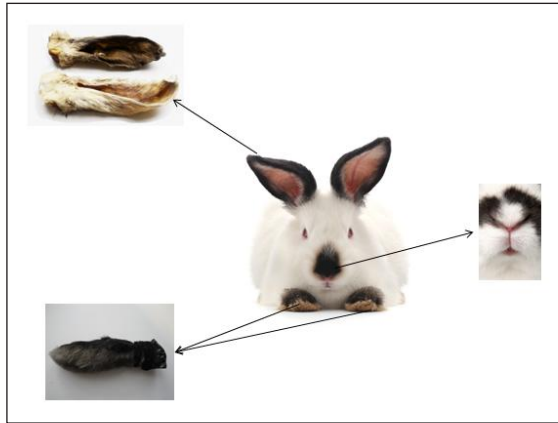
Figure 3 - *Cutting of rabbit by-products*

Dedicated cuts have high functional and technological properties and can be used in the formation of assortment lines of meat products that meet the most sophisticated needs of the population. At the same time, boneless meat of manual or mechanical deboning serves as an excellent basis for creating products of high biological value and with bio-corrective properties.

The problem can be solved, for example, by adding to the composition of pre-scription and layout solutions of kupaty sprouts lentils. The properties of lentils are widely known, it is traditionally grown in the Central Black Earth region of Russia.

Cooking kupaty using lentils begins with the germination of grains and pre-liminary heat treatment. Lentils contain a large amount of macro- and microele-ments, vitamins, and its proteins are close in properties to meat proteins. Vitamin C and amino acids such as methionine and cysteine are present in germinating seeds. 100 g of lentil contains 295 kcal. In addition, it is rich in fiber, especially green varieties. [10]

It is also worth noting the interest of meat industry producers in an alternative, additional source of vegetable protein - soybean substitute, since most consumers experience allergic reactions to soybeans that are introduced into the product in order to reduce raw material costs and improve the functional and technological properties of minced meat. In addition, soybeans are 90% imported from abroad and are GMOs.

The use of lentil protein is recommended in the technology of combined and artificial meat products in order to maximize the digestibility of meat products and to ensure the normal course of metabolic processes in the human body. [8, 9]

To ensure that it has the desired properties, it has been found that it has appeared. As a result of this operation, it's undesirable to disappear. For the kupaty were prepared: trimmed pork, pork jowl, mechanically deboned rabbit meat, sprouted roasted lentils were up to 6 mm.

To ensure the required taste properties, lentils were fried with a minimum amount of vegetable oil until golden brown appeared. As a result of this operation, the undesirable smell and taste peculiar to legumes finally disappeared. Further, the raw materials for the Kupaty were prepared: trimmed pork, pork jowl, mechanically deboned rabbit meat, sprouted roasted lentils were ground on a top with a grid diameter of 6 to 8 mm.

Crushed raw materials without carrying out the process of salting were directed to the preparation of minced kupaty. Before making minced meat raw meat, the additives and materials were weighed in accordance with the recipe. Germinated lentils were added in an amount of from 3 to 9%, depending on the selected recipe. The preparation of minced kupaty was carried out in mixers of various designs, in which the ingredients included in the formulations were mixed for 10-20 minutes to obtain a uniform stuffing. Water when cooking stuffing was not added. Complex food additives "Premixes" were added to the stuffing in a dry form at the beginning of the mixing process, evenly distributing them over the surface of the stuffing. The stuffing in a natural casing was stuffed on syringes, adjusting the density of the stuffing. Ready-made semi-finished products were packed in bags and packed under vacuum.

In the developed formulations of kupaty there is less moisture, more ash, which indicates a higher content of dry nutrients, including due to the introduced plant materials.

Experimental batches of kupaty with different content of components were prepared. A comparative assessment of the functional and technological properties of the control and experimental samples showed that the moisture-binding, water-holding and fat-holding abilities of rabbit meat kupaty are less than the porcine-beef kupaty.

Table 1 - Determination of functional and technological properties of the control m of the prototype

Indicator	Kupaty with rabbit meat	Pork and beef kupaty
ВСС	75,3 %	78,7 %
ВУС	62,7%	68,6%
ЖУС	80%	92%

Determination of digestibility was performed by an in vitro method by exposing the product proteins of pepsin and trypsin enzymes with constant stirring and removal from the reaction of hydrolysis products of dialysis, which avoids inhibition of digestive enzymes by low molecular weight peptides and free amino acids - products of protein hydrolysis.

Table 2 - Changes in the concentration of hydrolysis products in solution during digestion

product	Digestion time, h					
	1	2	3	4	5	6
Kupaty with rabbit meat	0,227	0,448	0,642	0,869	0,972	1,283
Pork and beef kupaty	0,295	0,503	0,742	0,954	1,063	1,483
Sprouted lentils	0,376	0,576	0,835	0,997	1,175	1,632

Kupaty with rabbit digestibility with replacement of 6% of minced meat by sprouted lentils was 93%, pork and beef kupaty with replacement of 30% of minced meat by sprouted lentils was 92%, digestibility of the sprouted lentils 98%.

To study the interaction of various factors that determine the organoleptic and physico-chemical indicators of rabbit meat from the rabbit meat, mathematical methods of experiment planning have been applied. The mathematical description of this process can be obtained empirically. At the same time, his mathematical model has the form of a regression equation, found by statistical methods based on the results of experiments.

The following factors were selected as the main factors: X1 - the dosage of applied germinated lentils in kupaty with a rabbit,%; X2 is the fat-holding capacity of kupaty with a rabbit, %. All these factors are compatible and not correlated with each other.

The criterion for assessing the influence of various factors on the organoleptic and functional-technological indices of rabbit meat kupaty were selected: Y1– protein content in kupaty with a rabbit,%; Y2 is the fat content in the kupaty with a rabbit.

A full factorial experiment 22 was chosen for the study. In this case, the central composite rotatable uniform planning was applied. The order of the experiments was randomized by means of a table of random numbers, which excludes the influence of uncontrolled parameters on the experimental results. Experiments at each point of the matrix were performed in triplicate.

When processing the results of the experiment, the following static criteria were applied: checking the homogeneity of variances — Cochren's criterion; significance of the coefficients of the regression equations — Student's criterion; adequacy of the equations — Fisher's criterion.

As a result of statistical processing of experimental data, regression equations were obtained that adequately describes this process under the influence of the studied factors:

$$y_1 = 17,38 + 7,12843 \cdot X_1 + 0,141421 \cdot X_2 - 2,62938 \cdot X_1 X_2 + 1,31 \cdot X_1{}^2 - 0,49 \cdot X_2{}^2$$

$$y_2 = 23,14 - 0,106066 \cdot X_1 + 0,601041 \cdot X_2 + 0,05 \cdot X_1 X_2 + 0,055 \cdot X_1{}^2 - 0,545 \cdot X_2{}^2$$

Figures 3-5 show curves of equal values of output parameters, which carry the meaning of nomograms and are of practical interest.
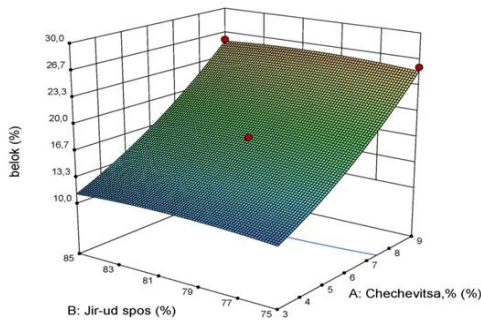
Figure 3 - Graph of a three-dimensional surface.
The dependence of the protein content in minced meat (Y₁)
on the amount of applied lentils (X₁) and the fat-holding capacity of minced
meat (X₂)
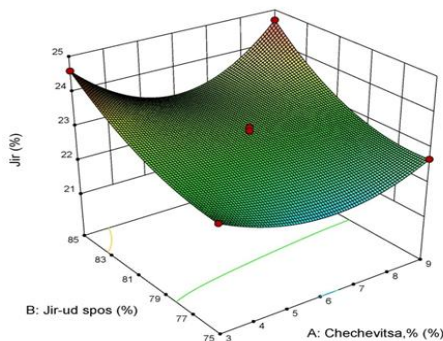
Figure 4 - Graph of a three-dimensional surface. The dependence
of the fat content in minced meat (Y) on the amount of applied lentils (X₁) and
the fat-holding capacity of minced meat (X₂)

The enhanced area meets the specified optimization criteria, and the graph also shows the optimum values of the input factors for the corresponding output values. Adding 6% germinated lentils to the composition of minced kupaty achieves optimal values for fat (23%) and protein (16.9-17.3%).

The data obtained allows us to optimize the formula of kupaty, which the authors propose to use for feeding athletes, as these products contain a lot of protein and animal fat.

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软件开发模块的功能任务"查看现有软件包及其更新"企业信息系统生产组织
FEATURES OF THE SOFTWARE DEVELOPMENT MODULE TASKS "VIEW OF THE EXISTING SOFTWARE PACKAGES AND THEIR UPDATES" CORPORATE INFORMATION SYSTEMS PRODUCTION ORGANIZATION

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抽象。 本文介绍了设计"现有应用程序包及其更新的会计"任务的软件模块的结构和开发阶段，创建了一个可行有效的应用程序，用于计算公司信息中计算机技术的基本信息。 生产组织的系统。 在对主题领域进行分析的基础上，提出了研究主题 – "现有应用程序包的核算及其更新"的任务及其简要特征；对输入输出数据进行分析，构建概念数据方案；证明了软件和开发工具的选择和架构；开发了软件应用程序的数据库，图形界面和模型。
关键词：企业信息系统，平台"1C：企业"，软件界面，数据概念架构。

Abstract. the article shows the stages of designing the structure and development of the software module of the task "Accounting for existing packages of applications and their updates", the creation of a workable and effective application for accounting of basic information about computer technology in a corporate information system of a production organization. On the basis of the analysis of the subject area the subject of research is presented – the task "Accounting for existing packages of applications and their updates" and its brief characteristic is given; the analysis of input and output data is carried out, the conceptual data scheme is constructed; the choice and architecture of software and development tools is proved; the database for the software application, the graphical interface and the model is developed.

Keywords: corporate information system, the platform "1C: Enterprise", the software interface, conceptual schema of the data.

Introduction

Information and technologies of analysis and exchange at the present stage of development of the Russian digital economy are of great importance in all areas of human activity. At the present stage, most enterprises for automation of production, operational and management accounting uses computer systems and

corporate information systems (CIS). The use of CIS in the process of enterprise management makes it more competitive, increasing productivity and the ability to quickly adapt to changes in market conditions.

The Annex considered in this study provides a practical account of the receipt and operation of application packages in the organization. Using this application will simplify the work of the engineer of information computing Department, and other professionals whose work is related to accounting SOFTWARE.

The study aims to design, create a database and develop a software module that can perform the basic functions of accounting SOFTWARE in the enterprise.

In the article we consider the implementation of the following research tasks:
• analyze the subject area, study the subject of the study and give it a brief description;
  • perform analysis of input and output data, build a conceptual data schema;
  • develop a graphical interface for the software module and a layout sample;
  • perform tests of the developed software.

Methods

Methods of conceptual modeling, graph theory, matrix theory, theory of formal grammars and languages, based on object-oriented and domain-specific approach to programming, were used to solve the problems set in the study. Modeling on personal computers and in computer networks is performed using ready-made and independently developed software.

The platform "1C: Enterprise 8"was chosen as the environment for the program implementation of the task. The platform " 1C: Enterprise "is used not only as a means of configuring the application solutions supplied by 1C, but also as a means of creating new application solutions (both using standard fragments and without them). At the same time, it is used to create mass-produced solutions, and to develop individual solutions "to order".

On the 1C: Enterprise platform, the process of writing software code is not the Central element of SOFTWARE development. The application is designed primarily as a metadata structure. Code is written in specific nodes of the application "as needed" to override, if necessary, the standard behavior or to write the part of the business logic that requires algorithmic formulation, such as cost calculation. That is, there is a framework that defines the overall appearance of the application, and the application is defined as a set of different artifacts that function in this framework-E. the Idea of developing based on metadata (metadata-driven) is beginning to be actively used in universal systems, but in a domain-oriented development environment, it gives a much greater effect, since the structure of metadata is clearly focused on the range of tasks solved by the system.

One of the points that are usually controversial is the construction of the main part of the application on the 1C:Enterprise system.

Prototypes are used with some parameterization, which determines the necessary properties and behaviors in a particular case. For example, a dictionary can be "flat" or hierarchical. This approach actually ensures that the application is built on the basis of a specific application model, in which each object plays a role, and the system is well aware of this role, which allows it to automatically perform a significant part of the operations. Above we talked about the provided technological model of the application. Note that these two models (technological and applied), on the one hand, are ideologically connected, but on the other – have a fairly high level of independence in terms of implementation. This approach allows the platform to use new architectural and technological solutions without changing the application model and without changing the application.

Another feature of the system "1C: Enterprise" as a domain-oriented development environment-a special attitude to the selection of technological

Results and discussion

Software implementation of the task "Accounting for existing packages of applications and their updates" is performed by means of " 1C: Enterprise 8»

In the Configurator mode, the main objects for solving the problem of "accounting for existing application packages and their updates" are created: directories, enumerations, documents, accumulation registers, reports, user interface. At the initial stage in the system developed manuals, forms and list items.

For registration of business operations developed documents: "journal of SOFTWARE changes", "Application for installation, update" and "update Plan from the developers", the form of the list of documents, the form of documents.
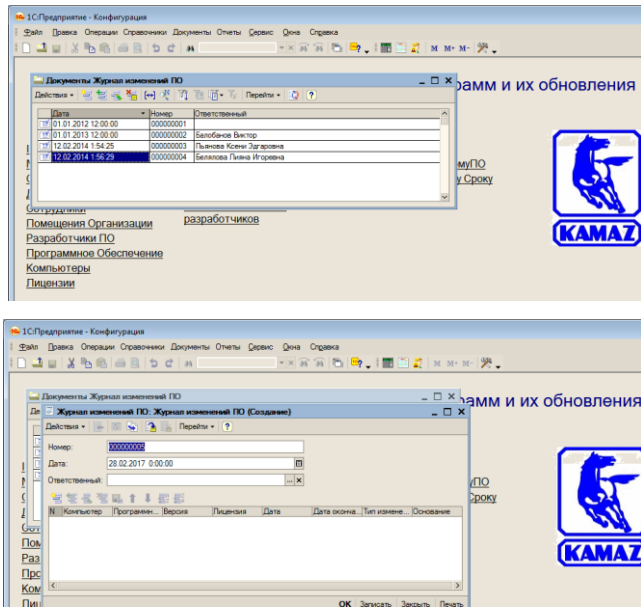
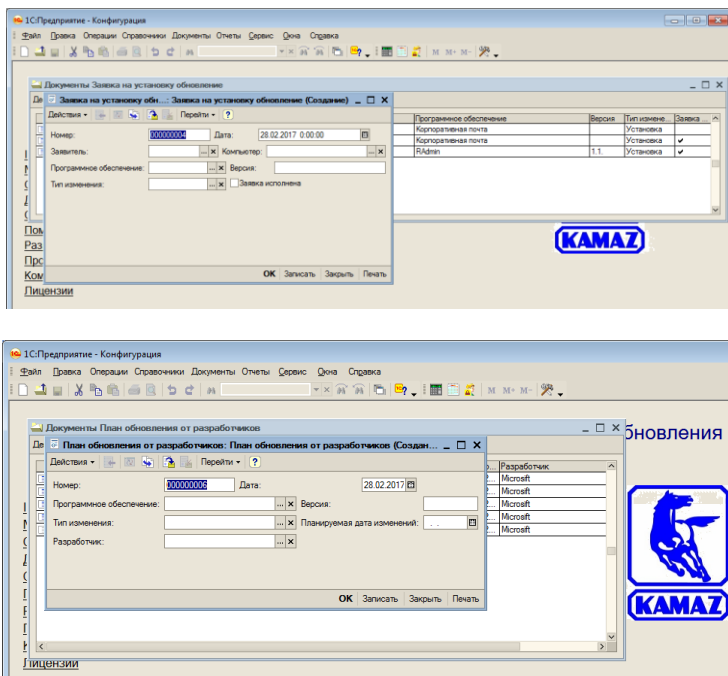**Figure 1.** *The form of the document "the change Log FOR»*

Figure 2. *The form of the document "Application for installing, updating»*

To accumulate information, accumulation registers reflecting the movements of documents have been created.
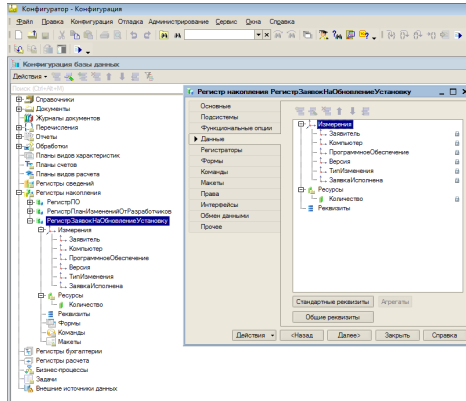

Figure 4. *The data of the register of accumulation,*
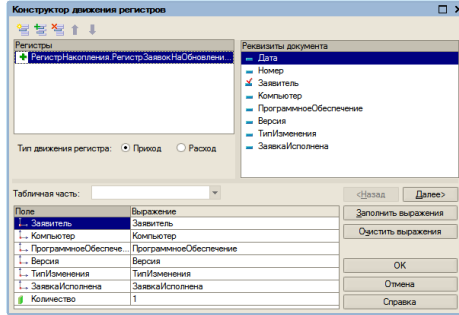*"Application for installing, updating»*

Figure 5. *The designer of the movement document to the register,*
"Application for installing, updating»

Using the circuit layout data and layout of the output form is designed reports. Directories, forms of the list and elements of directories are developed. Created user interface, function panel.
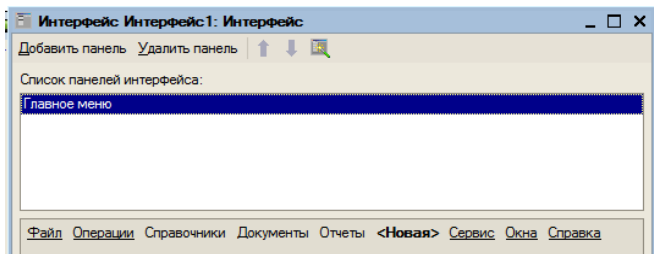
Figure 6. «User interface.»Summary

The software implementation of the task "Accounting for existing application packages and their updates" works in an interactive mode, offering the user a certain set of features implemented in the program.
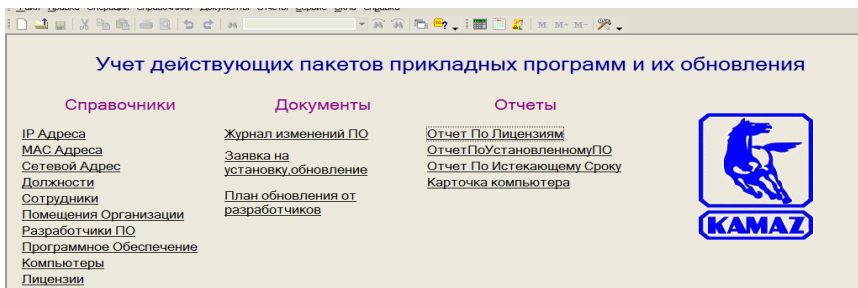
Figure 7. The main menu of the program 1C:Enterprise

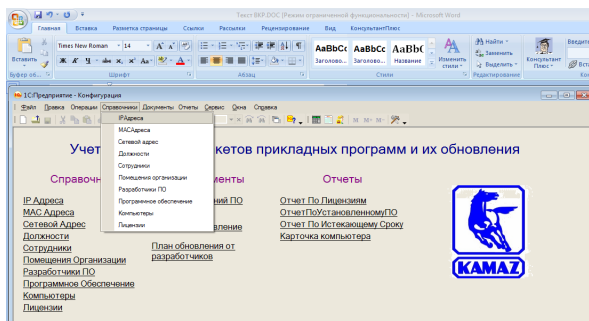Menu item reference contains a reference of the subject area (Fig. 8).

Figure 8. Handbooks

To create (add to the program) new documents, use the "Add" button on the toolbar. When you click the form opens, where the necessary details are filled.

The document "SOFTWARE change Log" contains information about installations, SOFTWARE updates (Fig. 9).
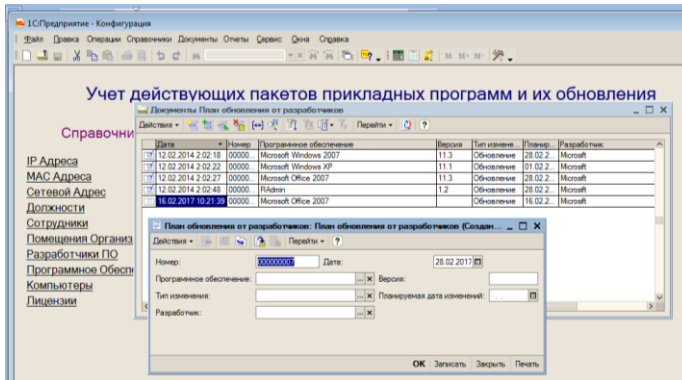

Figure 9. *The document "Application for installing, updating»*

Отчеты формируются при выборе соответствующего пункта меню или строки на панели навигации (рис. 10).
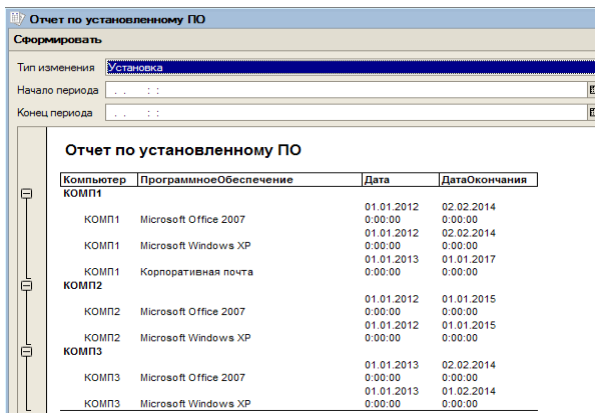

Figure 10. *"Installed SOFTWARE report»*

Figure 11. *"Report on the expiring date of the license»*

To combat unauthorized access to the information system "1C:Enterprise" performed various actions related to the administration of the system. Such as:

1. Maintain a list of users.
2. Assign rights to users.
3. Backup copying.
4. Create a technology log for error analysis.

The list of users contains only those users who are allowed to work with the system. This list is used to authorize the user to log in. In order to prevent users from logging into the system "1C:Enterprise" under false names, each user who is allowed to work with the system has a password to log in. Like the user name, the password is used to confirm the user's authority to work in the system.

The system regularly backs up the most important data sets and stores them properly. This procedure is performed periodically so that in the event of database failure, you can recover the original data with minimal loss.

Conclusions

The results of the analysis activities of the information and computing division confirmed the necessity of development in the keys of the accounting module of computers and software in the organization, the result of this analysis was developed by the task module "Accounting of existing software packages and their updates." This module is an independent application of the analytical type significantly reduces the time for processing information as input and output.

The project activities carried out on this study have made it possible to develop an information system based on the accounting of computers in the organization. Such a database application helps to automate the work of the engineer of information computing Department, and other professionals whose work is related to the accounting of computers. The operations and calculations performed in the application comply with the accepted rules and norms of accounting for computers in the enterprise.

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在医学中使用纳米技术治疗肿瘤疾病
USING NANOTECHNOLOGIES IN MEDICINE TO CURE ONCOLOGICAL DISEASES

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注解。　这项工作分析了在治疗肿瘤疾病的过程中使用纳米技术的可能性。特别地，提供了一种物理 – 数学模型，其提供了在真实因素的观点中获得实际任务的适当解决方案的机会，其描述了癌症的生物物理和医学图像。
关键词：纳米医学，激光辐射，肿瘤疾病，纳米材料。

Annotation. This work analyses possibility of using nanotechnologies during the treatment of oncologic diseases in medicine. In particular, there is offered one physics-mathematical model which gives an opportunity in the view of real factors to receive appropriate solution of the realistic task, which describes biophysical and medical image of cancer.

Keywords: Nanomedicine, laser radiation, oncological diseases, nanomaterials.

Introduction

In recent decades, the study of using nanotechnologies to prevent, to diagnose and to cure different types of diseases, has been increased. Currently, nanotechnologies are going through clinical testing, which allow us to use them in medical practice. This will become guaranty, for lots of diseases which are impossible to be cured, to be defeated by a human.

Currently, among the most common diseases are cardiovascular and oncologic diseases, from which millions of people are suffered. In spite of the fact, that in recent times those diseases are widely outspreaded, they can't be finally cured. These factors led to prepare this article, which will encourage medics and technical academics to solve these problems.

Theoretical model

Modern medical scholars argue, that the cause of organs' and nervous system pathology, is that pathological formations are cellular structures with changed parameters, which represents the whole integrated system [1]. Systematical mechanisms of pathological disruption are revealed during different types of pathology,

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in different levels of structural-functional organization of nervous system. In result, different types of pathological processes are revealed as the various types of deseases. In many varieties, the methods of regulation the whole system of human organism, is an interdisciplinary scientific task [2]. Hereof, the issue is too complicated from a practical standpoint, there is a mathematical model proposed in this article, which is result-oriented and will make easier to manage the process of treatment.

In this work [3] was proposed one model of radiation, with the laser beam on the nanoparticle or a cell. Taking into account the fact, that origination of acoustic wave will be noticed as a result of such irradiation, which impacts not only on the nanoparticles, but on the surrounding areas. In this way, bifurcated area will be originated near the cancer cells. In this work is found, so-called, inverse distribution function.

In this work, we will discuss waveguide areas which are formed in above mentioned cases, and in which can be spreaded laser beams. In order to study the task, let's use the opinions used in the work [4].

Thus, for example plane harmonic waves are formed in above mentioned cases. In particular, let's discuss the behavior of radial wave, which is formed in a bifurcated area, after spreading radial waves and it has essential meaning in this particular case and matches with the real example.

Let's regard, that in the discussed case, there is generated a waveguide, which can be described in this expression:

$$i\frac{\partial E}{\partial t} + \frac{\partial^2 E}{\partial z^2} + 2\sigma \cdot \delta(z) \cdot |E|^2 \cdot E = -\alpha \cdot \delta(z) \cdot \boldsymbol{E}; \qquad (1)$$

Here, parameter σ is an irritator inside the waveguide, α- characteristic parameter of defects.

Considering the following scenario, that waveguide is described not only with nonlinear members, but also enhances the chance of approximation with real picture.

So, (1) expression can be written down as following:

$$i\frac{\partial E}{\partial t} + \frac{\partial^2 E}{\partial z^2} = \beta \cdot \delta(z) \cdot |E|^2 \cdot E, \qquad (2)$$

In which the solution for the stational localized case, has the following expression:

$$E = E_0 \cdot exp\{-\varepsilon|z| - i\omega t\}; \qquad (3)$$

In which $\varepsilon = \sqrt{-\omega}$ and $E_0 = \sqrt{\frac{2}{\beta}} \cdot \sqrt{\varepsilon}$. Wave frequency ω is depended on the wave frequency, such as, an harmonic oscillator's amplitude is depended on its vibration.

$$\omega = -0{,}25\beta^2 \cdot E_0^4; \qquad (4)$$

If we introduce the full "capacity" of optical flux (i.e. number of elementary irritators):

$$N = \int_{-\infty}^{+\infty} |E|^2 dz \qquad (5)$$

and its full energy

$$W = \int_{-\infty}^{+\infty} dz \cdot \left\{ \left| \frac{\partial E}{\partial z} \right|^2 \right\} - \delta(z) \cdot |E|^4; \qquad (6)$$

then it turns out, that these quantities aren't depended on the frequency ω in the presented model:

$$N = {}^2/_{\beta}, \, W = 0. \qquad (7)$$

Moreover, it should be noted that this quality isn't universal while providing nonlinearity around the waveguide, when (2) there is added the member $2 \cdot |E|^2 \cdot E$, on the left side of the equation, we shall receive:

$$N = \frac{2}{\beta} \cdot \left[1 + \varepsilon\beta - \sqrt{1 + \varepsilon^2 \cdot \beta^2} \right], \qquad (8)$$

And (2) considering linear refrangibility in the waveguide, when on the left side of equation is added a member, the expression will be:

$$-\beta \cdot \delta(z) \cdot E,$$

[5]: and thus dependence is received:

$$N = 2 \cdot \left(\varepsilon - \frac{\beta}{2} \right). \qquad (9)$$

Likewise to write down[4], the solution of equation (1) will be:

$$E(z;t) = E(z) \cdot \exp(-i\omega t), \qquad (10)$$

In which $E(z) \to 0, z = \pm\infty$, when as a result the solution can be written down as follows:

$$E(z,t) = \sqrt{\frac{2\varepsilon - \alpha}{2\sigma}} \cdot \exp\{-\varepsilon|z|\} \cdot \exp\{-i\omega t\}. \qquad (11)$$

In which $\varepsilon = \sqrt{-\omega}$ and local wave frequency equals:

$$\omega_i = -\frac{a^2}{4}. \qquad (12)$$

Now, if we fill in the solution (11) in the equation (5), we can find elementary excitation in local condition according to its dependence on frequency:

$$N = \frac{\varepsilon - \alpha/2}{\sigma \cdot \varepsilon} = \sigma \cdot \left(1 - \frac{\alpha}{2\varepsilon} \right). \qquad (13)$$

In this case full energy will have the following expresion:

$$W = \int_{-\infty}^{+\infty} dz \cdot \left\{ \left| \frac{\partial E}{\partial z} \right|^2 - \sigma \cdot \delta(z) \cdot |E|^4 - \alpha \delta(z)|E|^2 \right\}; \quad (14)$$

From there we can find easily the dependence of local condition on the frequency through the expression (11):

$$W = -\frac{\alpha}{2} \cdot \frac{\varepsilon - \alpha/2}{\sigma}. \quad (15)$$

If we expel frequency in the expressions (13) and (15), the dependence will have the following pattern: $W = W(N)$:

$$W = \frac{\omega_i \cdot N}{1 - \sigma N}. \quad (16)$$

The given dependence $W = W(N)$ has different picture for various localized conditions.

In this work [6] there is described, that the general expression of dependence is: $a = \frac{\partial W}{\partial N}$ has the following image:

$$\omega = \omega_i (1 - \sigma N)^2. \quad (17)$$

If we consider distribution's pattern of reversed function, which was given in work [3]:

$$x_n = x_{n-1} + \frac{1}{f'(x_{n-1})} \left(\sqrt{f^2(x_{n-1}) + 2f'(x_{n-1})[\alpha - F(x_{n-1})]} - f(x_{n-1}) \right)$$
(18)

in which:

$$f'(x_{n-1}) \neq 0, \quad (19)$$

$$x_n = x_{n-1} + \frac{\alpha - F(x_{n-1})}{f(x_{n-1})}. \quad (20)$$

when:

$f'(x_{n-1}) = 0, f(x_{n-1}) \neq 0; n = 0; 1; 2; \ldots$, in which $f(x) = F'(x)$ – is a distribution function and for which exists $f'(x)$. Which the help of expression (18), (17), (15) and (13), can be determined physical parameters of cancer. This will help to receive maximal effect and radiate cancer cells much more effectively, with nanomaterials and with the appropriate amount of laser radiation wave.

Discussion and analysis

In recent years, nanoparticles can be successfully used in medicine due to the using nanotechnologies and obtained success in medicine. Different methods are used to activate nanoparticles and quantum points, if they are entered in human organism. Moreover, using laser technique is more effective than the other methods. Therefore the effect of treatment essentially enhances due to the possibility of regulating laser's flux, efficiency and frequency. Besides, healthy tissues and cells are less damaged, which also has a key role.

With the help of above-mentioned model, nanomaterials can be used more effectively to cure cancer. In particular, all the important physical parameter of the cancer can be seen, after examining tomographic scans of the appropriate organ's cancer. It helps us to use the function of pathological area distribution, suggested in this work [3]. The results of work [3] and the model of work [4] are examined through the modeling methods. Thus, we can exactly determine the radiation area of laser beam, which is more effective than the other existing methods.

Received results are very important for using nanotechnologies in biomedicine. In addition, achievements of nanotechnologies can be widely used in practical and clinical medicine in the near future, which will help us to receive impressive results.

Consequently, in the given model, in optically linear area, is described possible localized areas of waveguide areas with due to the method of nonlinear Schrödinger equation and distribution function. The results show that developing this method can solve the problem of pathological processes of treatment, which is very important for modern nanomedicine and biomedicine. In addition, above discussed issue needs further clinical examination and specification. It's possible that, this method will make scientists to innovate new technologies, which may have connection with regeneration of human organism, its organs and cell system. It gives opportunity to enhance treatment's level during the different types of nosological diseases at the early stages.

Conclusion

Therefore, in this suggested work is found common typical parameters formed from laser radiation on the pathological system. Discussed issue is important for not only nanomedicine, but it also has wide utilization for studying other issues, including nonlinear dynamics of solid body and optical wave conductors in nonlinear environment (7). Therefore, this method will be useful for solving more efficiently actual problems of nanomedicine and biomedicine.

The author hopes, that discussed issues will be subject of discussion, which would prove the efficiency of the suggested method. In addition, it's important to timely receive the results of experiment in order to continue theoretical researches of this issue and to determine specifically theoretical models, which is important for using lasers and nanoparticles in medicine.

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