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"An investment in knowledge always pays the best interest." Benjamin Franklin

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## THE OBSTACLES AND BARRIERS WOMEN FACE IN GEORGIAN REALITY

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### ABSTRACT

The following article reviews women’s problems in Georgia and the attitude of society toward the subject. Due to the fact, that country tries to develop into a European state with worthy European values, there still is a huge problem in gender issues. Thus, it is clear that Gender politics is one of the main and essential indicators for the country’s democratic development. Many non-government organizations and other social bodies are working on the problem; they have gradually introduced gender equality into the political discourse and placed it on the list of required reforms. However, along with many other emerging social problems and political tensions, this issue has not yet paid any closer attention. It is crucial to realize that without gender equality we cannot succeed as a democratic-developed country - because there is no democracy without gender equality.

**Keywords:** Gender equality, women’s right, domestic violence, non-government organizations, Ethnic minority, early marriage.

Issues, that are related to gender equality and women’s right may not become noticeable from the very first glimpse in modern Georgia. The Georgian State Concept on Gender Equality has first defined gender equality in 2006 as “an integral part of human rights referring to an equal presentation, rights, responsibility and participation of women and men in all spheres of private and public life.” The 2010 Law of Georgia on Gender Equality defined it as “a part of the human right’s referring to equal rights and obligations, responsibilities and equal participation of man and women in all spheres of personal and public life.” Until 2006 there was no exact definition of gender equality in Georgian language, since the term gender equality has been used replaceable with “gender equity” in Georgian language because it had not related translation until today (Boll 2013: 17-18).

Although the word “gender” has developed as an essential part of our language along with many European countries long before, obvious uncertainty and vagueness raised in connection with its interpretation. However, remarkable progress has been developed toward an advanced condition in this field during the last few years, as a consequence of non-governmental organizations’ efforts and several changes in the law, Georgian society is still noticeably far from divining its exact meaning.

In the last decade, with the great support of donor organizations different projects concentrated on gender equality and women’s rights protection have been achieved in Georgia and the process is steady and irreversible. Such projects have helped the establishment of organizations that are focused on gender and women’s rights.

Organizations, studying gender equality issues and are involved in solving these problems have gained valuable experience, that can be used in this specific field to protect gender interests and defend women’s rights. The non-government organizations and initiative groups working on gender equality and women’s rights nowadays include almost every regions of Georgia, where the problem is evidently plain. Thus it is very important to focus on problem areas and utilize their capacities and influence in the society in a profitable way (Rusetskaia 5-6).

General world practice shows that women and girls that are the member of certain ethnic, racial or religious minorities mostly have less access to education, employment and health services. Besides, they also experience domestic violence, as men discriminate against them in their own communities and even in their families, usually when gender stereotypes and deep-rooted vicious and faulty practices firmly prevent female emancipation process (UN WOMEN 2014:2).

In 2013, UN Women Georgia, in cooperation with the Institute for Social Studies and Analyses (ISSA), Tbilisi, conducted a study on The Needs and Priorities of Ethnic Minority in the Kvemo Kartli Region. The study gives detail review of the obstacles and barriers these minority women have in public life and decision-making process. Due to the fact that they have numerous problems, such as lack of knowledge of the majority language, lack of access to basic social and legal services, and a high school drop-up rate among girls that is caused by early marriage. (UN WOMEN 2014:3).

In some remote and poor regions of Georgia where schools have a few or no funds, boys tend to leave schools at an early age to work and earn money. This case frequently occurs among ethnic Azerbaijan communities living in Georgia, parents may attach little importance to the education of girls and in cases of early marriage, girls could leave school as early as age 13 or 14. Hopefully, civil society groups and corresponding organizations are advocating against this fateful practice of early marriage and they additionally support young women to obtain new skills and abilities (Duban 2010:26)

Early marriage is not typical just for Azeri's, but also for other groups of society. This fact could be the main barrier to women's further involvement in public activities. These women have little motivation to take part in any activity outside their families. Besides, family responsibilities do not allow them to dedicate time to a career. Therefore, they became addicted to the family body and find it very difficult to try a new job in public or civil services.

According to a widely accepted social consideration, women's vital function is to devote themselves to the family and thus to be a good mother and a housewife. In this case, society could be very strict and critical of the women who failed to fulfill their duty (Public Perceptions on Gender Equality in Politics and Business 2013:61)

According to the recent census, in many families, women are main breadwinners and they are mostly emigrant women, who leave homes for years to support their family. This fact has given them some degree of economic independence, but this new situation could not completely alter the traditional gender division of labor and women remain the primary caregivers, responsible for the housework and feeding and caring for the children (Public Perceptions on Gender Equality in Politics and Business 2013:7)

Finding a job is a very hard process for women than for men almost everywhere. They encounter a plenty of difficulties and obstacles when they try to find a place in the work environment. Under such harsh situation, they often take the responsibility to help their family financially and provide with other essentials. They can change their occupation easily and in a flexible way, they can get jobs that are not relevant to their abilities. The most common way of the unskilled employment is frequent trips to Turkey, Greece and Italy to work there as babysitters and cleaning ladies, for them who are not able to go abroad are tend to stand in the streets selling unimportant things that merely is enough for surviving.

The petty traders, housekeepers and nannies, the majority of which are women, struggle for better life conditions. Furthermore, in many cases, the whole family depends on these women. According to the recent statistic in informal employment woman outnumber men and people employed in the informal economy are in very difficult conditions (Sumbadze 2008:241)

Furthermore, women often are victims of domestic violence. There is continues hardness connected to cultural, gender or socioeconomic condition. Many families still live in hierarchical order, where two or three generation are living together and a woman has its definite role according to the stereotypes. When this kind of violence takes place, there still is a widespread opinion that domestic violence does not necessitate the intervention of the foreigners and that such issue must be solved in closed social circle – family (Ombudsman 2013:10).

Last decade Georgian government began to take measures and drafted a law against domestic violence. Nevertheless, part of society claims that it is not the main problem in Georgia. Simultaneously the victims are not willing to speak out about the fact with outsiders and do not tolerate the violence in the sake of keeping the family unit together. So they continue to live with violent partners for complex and different reasons (Nadaraia 2013:16)

It must be underlined that positive steps are put forward to solve existing problems in this field. Government and non-government bodies are working together to eliminate harmful practice and identify remaining legislative and policy gaps. Thus Georgia has made an important stride to match the national legal framework with international standards, for instance, the most recent ratification of the Council of Europe Convention on preventing and combating violence against women and domestic violence (Istanbul Convention) and enacting a series of accompanying alterations in national legislation.

In order to meet its international obligations, Georgia has reinforced its institutional structures to monitor and to resolve equality problems. Currently, the gender equality national machinery encompasses the Gender Equality Council within the Parliament, the recently created Inter-Agency Commission on Gender Equality, Violence against Women and Domestic Violence within the Executive branch, and the Gender Equality Department of the Public Defender's office. Charged with inter-agency coordination, monitoring the implementation of laws within the Executive branch and the development of national action plans on gender equality, violence against women, domestic violence and women, peace and security, the new Inter-Agency Commission complements the work of the parliamentary Gender Equality Council. The Public Defender's Office plays the crucial role to monitor independently the full range of gender Issues (GENDER EQUALITY IN GEORGIA: BARRIERS AND RECOMMENDATIONS 2018/p 21-22)



## CONCLUSION

Despite the fact, that Georgia has instituted many important reforms and implemented various decision to solve equality problems, some obligation still need to be translated into practice. Moreover, women's lack of awkwardness of their own rights and power keeps them from fully understanding their true virtue and strength. If the country opts for further development and progress, then one of the core principles should be women's rights and equality. We could not believe strong and rapid progress without developing these principles. Consequently, to drift equality issues forward and sustain main principles of women's rights, it would be the guarantee for effective and viable democracy.

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## INTERACTIVE METHODS OF ACTIVITIES IN TEACHING FOREIGN LANGUAGES

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### Xülasə

Məqalədə innovativ metod olan interaktiv metodun öyrənənlərin şəxsi xüsusiyyətlərinin nəzərə alınmasından bəhs edir. Bu metod müəllimin köməyilə öyrənənlərcün təqdim olunan mətn, audio və video materialların kombinasiyasıdır.

Müəllim informasiya texnologiyalarından istifadə edərək real həyatı problemlərdən qaynaqlanan bilikləri əldə etməyə çalışır. Bu nitq vərdişlərinin və xüsusiyyətlərinin formalaşmasına müsbət təsir edir.

**Açar sözlər:** interaktiv metod, xarici dillərin tədrisi, təcrübədən keçirtmək, müzakirə, qrup halında

### РЕЗЮМЕ

В статье рассказывается об индивидуальных характеристиках лиц, изучающих интерактивный метод как один из видов инновативных методов. Этот метод представляет собой комбинацию текстовых, аудио и видео материалов для студентов, работающих под руководством преподавателя. Преподаватель, использующий информационные технологии старается получить знания о реальных жизненных проблемах. Это оказывает положительное влияние на формирование положительных навыков особенностей.

**Ключевые слова:** интерактивный метод, обучение иностранного языка, испытать, обсуждение, групповая.

### INTRODUCTION

Teaching process is mainly based on two activities. They are imparting knowledge and acquiring knowledge. In the first case teacher sends information and the learners receive it. The innovative methods also deal with this process and their aim is to evaluate the activities of a teacher and learners using new ways and methods of teaching including new technical means of teaching. As we know that methodological approach in teaching foreign languages may be divided into three groups. They are Passive methods, Active methods and also interactive methods. If we speak here in the first place about the passive methods, it should be noted that in Passive methods a teacher is in the centre of teaching. He plays active role but the learners are passive. Control can be carried out by the way of questions, individual and control work, tests etc. It may be useful when it is used by an experienced teacher. Secondly, in Active methods learners are also active. Their role and activity is equal in the process of interaction. Learners may ask questions; express their ideas with a teacher. The last but it is in the first nowadays interactive method or approach is a modernized form of active methods. The most of teachers usually understand or mean cooperative action during the lesson. But here attention should be focused on inner action too. The learners should have inner motivation which involves them into active work or active participation at the lesson. In interactive method teacher's role is to direct learners activity to getting the aim of the lesson which include interactive exercises and tasks. Below some types of interactive methods are given:

**Brainstorming.** It is technique for generating new ideas on a topic. These methods stimulate creative activity of the learners in solving problems and express their ideas freely. Various variants of solving the problem are usually given here. In brainstorming quantity of utterances is important but not the quality. Teacher should listen to all utterances and not criticize them. Instead of this he inspires the learners to give as many variants of solving the problem as he (or she) can. Lacks of criticism create favorable conditions for the learners to express the ideas freely and these of course motivate them. At the end of brainstorming activity all the expressed utterances are written and then analyzed.

**Discussion.** This type of interactive method requires studying teaching material on the theme before starting discussion. After having learnt the lexicogrammatical material on the theme the learners may start discussion. This method helps the learners consistently and logically express their ideas by presenting grounds for their utterances. Here the learners work in small groups and this improves their activity because every member of the group may express his/her ideas and takes part in the discussion. The forms of organizing group work are the following:

- a) a theme is selected (chosen);
- b) learners must have learnt the chosen problem;
- c) groups are formed;
- d) teacher gives instruction and announces the time;
- e) controls the activity of learners and if it is needed, helps and stimulates them.



f) at the end of the discussion one representative of each group makes presentation.

**Cluster.** The next innovative method is cluster. It is one of widely used methods in teaching a foreign language now. It can be used in all stages of teaching English to both young and aged learners. In presenting new words a teacher writes a new word on the blackboard. And then learners tell the words that can be used together with the given word. For ex.: Then teacher gives a task to make up word combinations with the word “book”: my book, a good book, an interesting book, a nice book, etc. This method involves all the learners into active work and forms of motivation. It can be effectively used in improving monologic speech habits and skills.

## CONCLUSION

Role playing is also one of the activity used in teaching innovative methods. They are made to improve the efficiency of teaching. Role playing involves the learners into active work by positively influencing on their inner activity. This creates favorable conditions for cooperative work. Such atmosphere creates their motivation, personal potentials of inner activity and helps to form practical skills and habits. During the role playing such skills as creativity, getting out of the difficult situations, resourcefulness, self managing is formed and improved. Role playing has not only educational aim, but also has social aims because some life situations are modeled here for teaching. When a teacher uses role playing method in teaching the foreign language he/she should follow the below given instructions:

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## GSM TECHNOLOGY: ARCHITECTURE AND SECURITY

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### ABSTRACT

GSM means Global System for mobile communication. GSM is generally utilized mobile correspondence framework on the planet. GSM framework was produced as an advanced framework utilizing time division multiple access (TDMA) method for correspondence reason. In this paper we have introduced a concise review of GSM system. GSM arrange otherwise called 2G network. The possibility of GSM was produced at Bell Laboratories in 1970. It is generally utilized portable correspondence framework on the planet. GSM is an open and advanced cell innovation utilized for transmitting versatile voice and information service works at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.

Keywords - GSM, 2.5G, TDMA, Cellular Networks

### INTRODUCTION

GSM is an all inclusive acknowledged standard for computerized cell communication. GSM utilize narrowband Time Division Multiple Access (TDMA) for giving voice and content based administrations over cell phone systems. It is an advanced cell innovation utilized for transmitting versatile voice and information administrations. The idea of GSM rose up out of a cell- based portable radio framework at Bell Laboratories in the middle 1970s. GSM is the name of an institutionalization gather set up in 1982 to make a typical European cell phone standard. GSM is the most generally acknowledged standard in broadcast communications and it is actualized all inclusive [1]. GSM is a circuit-exchanged framework that partitions each 200 kHz channel into eight 25 kHz schedule vacancies. GSM works on the versatile correspondence groups 900 MHz and 1800 MHz in many parts of the world.

In US, GSM works in the groups 850 Mega Hertz and 1900 Mega Hertz. GSM claims a piece of the overall industry of more than 70 percent of the world's advanced cell endorsers. GSM makes utilization of narrowband Time Division Multiple Access (TDMS) strategy for transmitting signals. GSM was created utilizing advanced innovation. It has a capacity to convey 64 kbps to 120 Mbps of information rates. By and by GSM underpins more than one billion versatile endorsers in more than 210 nations all through the world. GSM gives fundamental to cutting edge voice and information administrations including wandering administration. Wandering is the capacity to utilize your GSM telephone number in another GSM organize.

### Architecture of GSM

The GSM specialized determinations characterize the distinctive components inside the GSM organize design. It characterizes the distinctive components and the routes in which they communicate to empower the general framework operation to be kept up. The GSM organize design is presently entrenched and with the other later cell frameworks now settled and other new ones being sent, the essential GSM arrange engineering has been overhauled to interface to the system components required by these frameworks.

In spite of the advancements of the more up to date frameworks, the fundamental GSM framework design has been kept up, and the system components depicted underneath play out an in distinguishable capacities from they did when the first GSM framework was propelled in the middle of 1990s .The GSM arrange engineering as characterized in the GSM determinations can be assembled into four principle territories :

1. Mobile Station
2. Base-Station Subsystem
3. Network and Switching Subsystem
4. Operation and Support Subsystem

### GSM security

GSM was expected to be a safe remote framework. It has considered the client validation utilizing a pre- shared key and test reaction, and over-the-air encryption. Be that as it may, GSM is helpless against various sorts of assault, each of them went for an alternate part of the system. The advancement of UMTS presents a discretionary Universal Subscriber Identity Module (USIM), that uses a more extended confirmation key to give more noteworthy security, and in addition commonly validating the system and the client, while GSM just verifies the client to the system (and not the other way around). The security show in this way offers secrecy and verification, however constrained approval capacities, and no

non- repudiation. GSM utilizes a few cryptographic calculations for security. The A5/1, A5/2, and A5/3 stream figures are utilized for guaranteeing over- the-air voice security. A5/1 was created first and is a more grounded calculation utilized inside Europe and the United States; A5/2 is weaker and utilized as a part of different nations. Genuine shortcomings have been found in both calculations: it is conceivable to break A5/2 continuously with a figure content just assault, and in January 2007, The Hacker's Choice begun the A5/1 splitting venture with arrangements to utilize FPGAs that permit A5/1 to be broken with a rainbow table assault. The framework bolsters numerous calculations so administrators may supplant that figure with a more grounded one. New assaults have been watched that exploit poor security usage, engineering, and improvement for Smartphone applications. Some wiretapping and spying methods capture the sound information and yield giving a chance to an outsider to tune in into the conversation. GSM utilizes General Packet Radio Service (GPRS) for information transmissions like perusing the web. The most generally sent GPRS figures were freely softened up 2011. The specialists uncovered imperfections in the ordinarily utilized GEA/1 and GEA/2 figures and distributed the open-source "GPRS interpret" programming for sniffing GPRS systems. They likewise noticed that a few transporters don't scramble the information (i.e., utilizing GEA/0) to recognize the utilization of movement or conventions they don't care for (e.g., Skype), leaving clients unprotected. GEA/3 appears to remain generally difficult to break and is said to be being used on some more advanced systems. In the event that utilized with USIM to forestall associations with fake base stations and downsize assaults, clients will be ensured in the medium term, however movement to 128-piece GEA/4 is still prescribed.

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## LANGUAGE – PROLIFIC SOURCE OF HUMAN MIND AND SPEECH

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### ABSTRACT

The paper encloses different aspects of language and its facets which influences the social way of thinking and speaking in human behaviour. As we argue, generating new words and other fundamental changes in linguistic as the main part of language development, makes a profound impact on the components of culture and language simultaneously.

The article also reviews the strong power of human words and speech that makes unforgettable sense of human evolution. The central issue is how important the word expression is and so features of the words expressed by human beings actually reveal their attitude and the way they perceive the whole world. So, language has played a prominent role in human history. Furthermore, the things we use in our everyday lives rely on specialized knowledge or skills human race produce through the language. The information behind these was historically coded in verbal communications, and with the advent of writing it could be stored and become increasingly complex and sophisticated.

As it is underlined, the evolution of human species absolutely depends on language, and if we carefully accept every change in as language with the correct approach to the issue, we really became inheritors of unusual and invaluable heritage.

**Keywords:** Language, human mind, society, development, culture, human community, words and speech.

Through the development of humankind, language presents a veritable phenomenon of cultural and linguistic richness. The labyrinths of language have many particular, difficult and different paths that are not easy to penetrate. As a consequence, every spoken language has its own uniqueness. And in the following article we are going to discuss and overviews some important aspects of this specific human resource.

From this very beginning, we can agree, that language is a special component of any culture. So far, it has formed a strong basis on which human societies have built their own identities. Considering the fact, that language is the most valuable and characteristic possession human race has, we can subscribe ourselves to certain religions, customs, values and worldviews which we take as self-evident. However, human communities have developed their cultural and linguistic behaviour over time: to gain different abilities adopting and understanding the world around them, getting different sets of beliefs, values and practices, different ways of communicating among themselves in daily life, and in all situations where we express ourselves through language. Thus, languages are a veritable goldmine of information about how humans can communicate to each other, both within the same linguistic community and between communities with different languages and cultures (UNESCO- 2003: 21-22).

As it is mentioned above, the world's languages represent an extraordinary wealth of human creativity. They carry the diversity of ideas, design the special systems of symbols for the purpose of communication and express human thoughts and feelings. They also are decisively important for the survival of humanity and of life on the planet. In that way, each language reflects an unusual worldview and cultural complex, it also formulates its own way of thinking, its interesting system of philosophy and understanding of the world around it. What is the most important, it is the means of expression of the intangible heritage of a nation, and the reflection of this culture remains an integral part of human beings, even after the annihilation of the nations (UNESCO-2003: 30).

Every actual issue in our world needs to be studied deeply, languages as a main and the most important content of human existence, are the unexpired and polygonal subject for linguistics. Linguistic by this name, and with its current concerns, is a relatively new occurrence. Dating back to the years of the twentieth century and traditionally analyse human language by observing an interplay between sound and meaning it becomes obvious that linguists are primarily interested in the strategies of particular languages, that tell us many things about the organization of the human mind, its development, the way it perceives and comes into relation with the world external to it. Thus, language rules the world, or as professor of linguistics, R. Lakoff says: 'Language is politics, politics assigns power, power governs how people talk and how they are understood. The analysis of language from its point of view is more than an academic exercise: today, more than ever, it is a survival skill' (Lakoff-1990: 3-7).

Language has multifunctional characters. Everything, that presents the human world and related to their life and feelings, is revealed into the language. Language gives the name and its individual identity to all the essence: what is the part of a language, it itself becomes the part of a culture. With its broad ethnographic meaning, culture is the whole complex of ideas, traditions, lifestyle, the vision of the world, national character and people's mentality. Cultural experiences are collected in the language. The semantic elements of the words move from epoch to epoch, enriches it with symbols and

contexts. The idea of the culturally derived word is associations, feelings, and profound symbols of 'signs' that are directly connected to the cognitive world. These thoughts are growing, symbolizing and transmitting into the language and conveys the knowledge, culture and morality of the humankind. It is also reflected in human knowledge of the external world because knowledge is expressed in a speech by the meaning of a language (Zh. Vardzelashvili-2010:62). Consequently, human means of communication (or language) is absolutely powerful. Its power lies within the language itself, therefore this power belongs to everyone, who possesses it. Because, we live in the age, where the vast masses of thoughts and knowledge are accumulated, it is important that the whole world about which the speaker has the knowledge of, should be brought to the minds of the listener so carefully, that they must not need to make much effort to comprehend it. Whereas, the separate words come into action and get meaning when they are spoken out, and they become influential when they are spread over (Mamardasvili-2011:293).

Above all, language possesses the power of a very special kind, it extends from large political context, to the small scenes of everyday life and this experience shows us clearly, that language is potent. Many proverbs and guiding expressions, created to explain the significance of spoken words, underline the profound importance of language and its affection and teach us to be careful of what we say:

- Silence is gold
- The pen is mightier than the sword
- The tongue is the hangman of the mouth.

Words can be powerful and become a tool in the hands of a wise man. So, it may easily affect reality we live in. They have change-creating force, although they do not make changes by themselves, and the way human being use of them. Words do not change reality, people using the words skilfully change it. And 'Like the guns, words make it possible for people to achieve effects they seek' (R.T. Lakoff-1990:13-15).

The real world we live in, our consciousness, human attitude and expressions depend on 'the way language works, then, it is that each person's brain contains a lexicon of words and the concept they stand for (a mental dictionary) and a set of rules that combine the words to convey relationships among concepts (a mental grammar)' (Pinker, Steve-1994:85).

Therefore, we can infer that language is the unique ability of *Homo sapiens*, with its magnificent forms and sounds, its structure and various sonority it is merely an art, but it widely differs from all ordinary arts. Since the men have instinct inclination to speak, the language has been invented and developed deliberately, it has been slowly and unconsciously evolved by many steps. When our thoughts get out of our mouth effortlessly, these stream of words are usually transparent, they often embarrass and fill us with strong emotions (Steven Pinker-1994:19-20).

As a result, it also has an influence over human affections and evokes their sensuality in a positive means. Nevertheless, its rich and complex structure. Language is not only expressed in words themselves, but it is also the way people make sense of them. Even a very simple combination of words, formulate into a sentence, may easily stir all positive and negative feelings: anger, happiness, laughter, sadness, despair, empathy etc. They surely help us, form our school of thoughts about a person, although, on the one hand they may prove wrong or false, or on the other hand they could be exaggerated and enhanced. Words alter into a strong weapon when they are used for the definite purpose, they have the ability to cause wars, rule the world and solve the problems. People utilize the words mainly to influence others and reflect their attitude toward different things in a subtle way. As one French proverb puts it: 'The spoken word belongs half to the one who speaks it and half to the one who hears.'

Lexical meaning is about the relations of words to thoughts and other human concerns. The most important, it relates words to reality - the way speakers commit themselves to a common understanding of the truth, and the manner they perceive and estimate things and situations in the world. It is also firm connections of words to emotions: the process in which words do not just point to things but are filled with impressions, which enrich the words with a sense of magic, love, hatred, and sin. More than that: 'The Linguistic is about words and social relations – how people use language not just to transfer ideas from head to head but to negotiate the kind of relationship they wish to have with their conversational partner'(Pinker-2007:3).

It is noteworthy, that the society makes its own reality itself, in the larger context it is a reflection of our mood, various of branches, and connections our language provides us with or makes it possible to tie up things, names and ideas together, so everyday growing language forms the universe interesting, complex, and multifaceted in which we live in. That is mainly caused by the fact that word with their meanings represent forms, but forms equally reach out to meanings. In a mere simplicity, in the world outside us we find what our language leads us, to expect and discover. Because language is not just a matter of communication, it basically expresses human knowledge, gracefulness, its rare creativity and self-awareness; 'it is also a way of displaying one's control over a medium, just as a fine horseman displays his horsemanship y the way he sits in the saddle and handles is horse(Bolinger-1980:66-67,3).

And the whole earth was of one language, and of one speech. And it came to pass, as they journeyed from the east, that they found a plain in the land of Shinar; and they dwelt there. And they said one to another, Go to, let us make brick, and burn them thoroughly. And they had brick for stone, and slime had they for mortar. And they said, Go to, let us build us a city, and a tower, whose top may reach unto heaven; and let us make us a name, lest we be scattered abroad upon the face of the whole earth. And the Lord came down to see the city and the tower, which the children of men builded. And the Lord said, Behold, the people is one, and they have all one language; and this they begin to do: and now nothing will



be restrained from them, which they have imagined to do. Go to, let us go down, and there confound their language, that they may not understand one another's speech. So the Lord scattered them abroad from thence upon the face of all the earth: and they left off to build the city. Therefore, is the name of it called Babel; because the Lord did there confound the language of all the earth: and from thence did the Lord scatter them abroad upon the face of all the earth' (Genesis 11:24-25).

It is not clear how, when and where languages first originated. Every society and scholars, individuals or scientists have their theories how language created. In the biblical tradition, as it is described in the book of Genesis, God created Adam and "whatsoever Adam called every living creature, that was the name thereof." Therefore, in most religious conveyances, there appears to be a divine source who provides humans with language and that deed is attached to the different saints. They also describe many ways how people began using the God-given language.

There are sets of theories, define other natural sound sources, according to which formation of language is based on the concept of natural sounds. One of these Japanese theories called 'bow-wow' and represents the idea, that the early human tried to imitate different sounds of objects flying by, therefore use them to refer to those objects. Another Japanese theory, known as 'poo-h-poo-h' proposes, that the words developed from the instinctive sounds people make when they are angry, happy, when they feel pain or are joyful, mainly in the emotional situations. The third theory named 'yo-he-ho' develops the idea, that the sources of human language were mainly the process of their physical effort. So, a group of early humans might develop a set of hums, grunts, groans and curses that were used when they were lifting and carrying large bits of trees, lifeless hairy mammoths or other huge things necessary for their everyday life or their survival (Yole-2016:3-4).

As we see, language has the steady linkage to the natural processes and its evolution, and it is a result of a long 'natural history'. Language is changing constantly, for old words got new sounds, volume and meanings. At the very beginning of human existence, there was not any speech just separate words and sounds. But, today, when we say language, we do not mean solely words, but the construction of words in grammar we use to put together to produce utterances that reflect our impressions of our lives, experiences, and environment, as well as enable us to affect people and events around us (McWhorter, John-2004:1-3).

To be more clear, speech has both an individual and a social side, and we cannot discuss one without speaking about the other. Besides, speech always implies both an established system and an evolution. Generally, it is an existing system and a product of the past. To distinguish between the system and its history, between what it is and what it was, seems very simple at first glance; actually the two things are so closely related that we can scarcely keep them apart (Saussure-1959:8).

Language is not illogically connected with human speech, on the contrary, they have a coherent relation, as a consequence, they could not exist separately. Both are special products of the power of a lexical and grammar formation, while it leads people to be an essential part of the social body as an individual. For speech includes several areas simultaneously - physical, physiological, and psychological - it is an invaluable component of human belongings. Language, compared with speech, is a self-contained and a principle of classification. Though we are fully aware of the differences among them and of their groups. Since, we review language at the first place among the facts of speech, language is an activity the character and structure of which express the culture and individuality of the speaker, and every individual perceives the world essentially through the medium of language (Saussure-1959:9).

The detailed classification list includes exactly 6,909 distinct languages. In addition, a group of languages can be determined as somehow genetically related to one another. Till the variety among them is awesome: they are not just variations on the French, German, Russian or others, we learn most often in school, but it also shows how language families spread and influence over different cultures and people. For further description of languages, that is understood as the particular set of speech norms of a particular community, are at this same time a part of the larger culture of the community that speaks those languages. They differ not only in pronunciation, vocabulary, and grammar but also through having different 'cultures of speaking.' And this fundamental process a language experiences over time is that grammatical words develop gradually from words that have a concrete meaning. Language always improves. Especially, the pathway from the first language to all of these variations was based on the fact that language always changes over time. But also the building of new words and constructions. Yet there was no time when this language suddenly changed to ours— the process was gradual. This has been happening to all languages around the world since language appeared (McWhorter, John-2004:12-13).

Thus, language is an integral part of communication. Taking into consideration the mentioned, another significant factor to consider is the issue connected with the cultural diversity in international communication. According to Lomia (2017: 22), it occurs when societies of different cultures are pursuing the same activities of great interest. As argued by Lomia, since the fundamental principles of human relationships are based on mutual understanding and the common consent, if a group of people have different ideas and beliefs regarding the specific social values, such as the religious, language, racism, ethnicity etc. unquestionably, it will almost be impossible for them to get along. In such a case, the root of the problem is grounded in cultural diversity.

Additionally, it is very important to stress that, the capacity of speech and its power over human mind is integral; it empowers society to inhale and estimate bare reality around them; in that way, it is a specific part of a separate expanse,



rare in the organic world. With its absolutely unique and deeply mysterious aspects, we can recognize that human languages are the system of a highly specific kind. The evolutionary origins, depths, the variety of its aspects, and therefore human ability to acquire and use language, testifies that there are very deep and restrictive principles that determine the nature of human language and accordingly are strongly rooted in the specific character of the human mind (Chomsky, Noam-2005:180-185).

As a result, we can doubtlessly consider language as a 'human essence', the remarkable attribute of human mind, unique to a man that are inseparable from any important phase of human existence, personal or social. It is a zenith of human intelligence to use language as an instrument for the free expression of thought and feeling; what comes to mortal minds of an individual may become an immortal product for the society, when these thoughts are said or written in a very neat, well-ordered, and punctual way. This creative use of speech can readily come into power; moreover, it illustrates that human mind is a significant product of nature, and every single thing, uttered through the language simply turns into a masterpiece. For instance, among the human created arts, poetry has a unique position, and by the use of the term 'poetical', we can imagine an element of ingenious imagination in any personal effort, for another term 'musical' could be used metaphorically to refer to a very sensual element. To explain this asymmetry, every approach of human talent makes use of a certain means of expression and this method of revealing poetry, literature and any other verbalization of human opinion and emotions in speech is uncommon in that language. Hence in the process of art formation, central symbol is language (Chomsky-2002:88-90).

## CONCLUSION

To summarize, language is the most supreme attribution, nature assigned human race with. It is so tightly interlaced into human experience, that we could imagine it only with its association to live; because it is as important and living as language itself. As we consider language as a combination of sounds and meanings, a close look at our speech – how we speak and what we mean – can, therefore, give us insight into who we are; shortly, it is a mirror of the human mind that reflects and makes firm expression about mental possibilities of an individual. Consequently, the expressive power language has, lies into words that are stored treasure in human memory and the human capacity to put their thoughts, feelings and emotion into words and thus give them the way through the human world.

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## DISPLACEMENT –ONE OF THE MAIN CHALLENGES FOR GEORGIA

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### Introduction

The value of multiculturalism and diversity has long been greatest merit for Georgia. The issues of migrations, its difficulties and objections pose formidable challenges country has to deal with for centuries. For many years already effective and coherent attitude towards this subject have helped greatly to establish divers and liberalistic society.

At the same time Georgia also is a country with a high rate of emigrants. Nowadays, because of country's harsh economic condition, many people tend to leave Georgia to settle in more developed and economically advanced countries. Where they hope to lead easier live, get better education and healthcare and change the living condition for themselves and their families.

In the following article we will give a brief description of countries migration policy and history, as well as conditions and ways of human coexistence, that forms interesting, complex and multiple society. Notwithstanding the obstacles, that regularly attends this subject, Georgian government attempts to find right way out of the problem. The government and the citizens understand that further development and independence of the country necessarily requires the consideration of multi-ethnic values. Subsequently, Georgia is an ethnically diverse country, where people of different ethnicity and nationality live peacefully side by side, work together, trade, demonstrate their individual and unique historical and ethnic customs and traditions, try to preserve their cultural heritage and develop.

Long lasting practise shows how crucial the tolerance is for harmonious life of the society. To respect different religious beliefs and particular habits is a guarantee for developing civic consciousness and take the constructive step forward. Consequently, joining the European family to preserve human rights and became honourable member of that family is the main target for Georgian people.

**Keywords:** migration, multicultural, diversity, ethnic groups, minorities, problems and challenges, attitude, approach.

The processes of migration are quite active issue in today's world. In the age of globalization, it became more and more common and this issue concerns all the nations all over the world. So we cannot discuss of it in a narrow perspective, but in a global frame of problem solving. There are several reasons that cause migration, and in the following article we are going to consider some of these basis in this challenging process. In its common expression, migration encloses a broad range of movements and situations involving people and affects our daily live profoundly, thus we could not stay indifferent toward this fact.

Human migration is a very complex, multifarious and long-existed phenomenon. In the last few years, migration has emerged as a crucial political challenge in matters such as integration, displacement, safe migration and border management. There are many factors that causes migration, including hard economic conditions, inequality, demographic problems, violence, conflicts, and environmental changes. Along with numerous different reasons, such as study, work, natural disasters, that make people leave their homes and seek better and safer place (IOM-2018:13).

The most current estimation of the numbers of migration may be expressed in figures that shows there were around 244 million international migrants in the world in 2015, which equates to 3.3 per cent of the global population. It is evident, that in recent years there are increased number of international migrants-both numerically and proportionally. The fact that is related to significant economic and geopolitical events (such as the global financial crisis in 2008 and the current conflict in the Syrian Arab Republic), and other fundamental reasons particularly linked with this issue, will reveal the trend to continue. According to the considerable rise in migration in the world over the past few years, we can predict that the next estimate of the global number of international migrants produced by UN DESA will exhibit a further rise in the scale of international migration and unfortunately also in the amount of migrants in the global population (IOM-2018:2).

In recent years a significant increase in displacement is clearly visible, both internal and across borders, which has largely originated in civil and transnational conflict, including extremism and other several cruel behaviours. It also concerns the acts of violence toward the individuals with a different vision. Current data indicate that in 2016 there were 40.3 million internally displaced persons (IDPs) worldwide and 22.5 million refugees. Further, the total number of people estimated to have been displaced globally is the highest on record. If this trend proceeds like that, then 2017 estimates of displacement will remain as high as the 2016 global figure, if not reaching higher (IOM-2018:3).

Here we want to underline that migration is a relatively new experience for Georgia. Harsh economic situation and extremely ineffective employment politics conditioned by increased external migration in the country. It played very important role in country's history. There are some different factors, which define and influence the current conditions.

The mass emigration wave was in 1990's, when country undergone military conflicts, that caused socio-economic hardship. The hard economic conditions remained unchanged, subsequently the emigration process became irreversible.

In our article we mainly rely on Geostat data. It publishes statistics about migration flows in the country and the results it may cause. Since 2012, Geostat has been using the UN-recommended methodology. According to this methodology, an emigrant is considered any persons (regardless of citizenship) who satisfies the following two conditions: 1. Left Georgia in the past 12 months and remained on the territory of another country for at least 183 days (can be the cumulative sum of several departures) and 2. Georgia was the person's usual place of residence, i.e. before leaving the country the person spent at least 183 days (including through a cumulative sum of several stays) in Georgia in the 12 months preceding departure (Migration profile of Georgia-2017:13-14).

GeoStat clarifies the number of migrants, that is alerting for the small country as Georgia. The data is classified by gender, figure and type of settlement, where migrants tend to go. As it is determined, the largest number of emigrants are in Russia and Greece, followed by Turkey, Italy, Germany and the USA. More than half (55%) of emigrants are women, although the gender ratio varies significantly by current country of residence. For instance, the majority of emigrants in Greece, Turkey and Italy are women, while it appears that primarily men emigrate to Russia and Ukraine (*idem*).

United Nations Department of Economic and Social Affairs (UN DESA), using different calculation methodology from GeoStat, publishes its data, according to which most of the foreign born citizens, who live and work in Russia are Georgians. The large number of people of the Georgian origin live in Greece, Ukraine, Armenia and Azerbaijan. According to the same data the number of Georgian emigrants has increased in both the USA and the EU countries (Migration profile of Georgia, 2017:15).

During the last few years Georgia's migration policy and its management structure has changed slightly. Consequently, the approaches and attitude of the government are maturing step by step. Although it still needs further improvement, because the issue is of vital importance. In this process Georgian government has been taking an absolutely new path toward the subject and tries to fix their own, local politics with the EU standards as a result of establishing a recognized EU standard (Chumberidze 2015:11).

In the age of globalization, the whole world faces the increasing problem of migration, which has largely arisen from the wars and conflicts, as well as from harsh economic conditions. People leave the countries of their residence to seek for better and safer shelters.

Georgia is a multi-ethnic country and therefore the coexistence of these ethnic groups are very important issue for Georgian people and its government. As we mentioned above, Georgian government attempts to keep the existing tendency of peaceful life between ethnic groups and improve the standards proximate to EU regulations. Nevertheless, the most valuable fact in all this process is that people of different ethnicity and nationality live side by side, work together and try to preserve their cultural heritage and develop. Vivid interethnic contact creates a very special atmosphere in the country. People enrich each other with new experience and vision. Thus it can be considered as one of the vital achievements of our country (Sarjveladze 2009:6; Jojua, 2010 *apud* Lomia 2017: 24).

However, the cases of ethnic conflicts and intolerance occurs sometimes. For example, in the early 1990's before disintegration the Soviet army demonstrated its aggression and antagonism in Caucasus, which caused political and social cataclysm in the region. There very series of ethnic conflicts. Therefore, many people lost their homes and became refugees. In the regions of Abkhazia and South Ossetia Georgia experienced terrible bloodshed and destruction, and consequently it caused the brake away of these regions. Which have been unbearable burden and greatest loss for the country until today (Sarjveladze 2009:7).

These two regions remained autonomous during the Soviet rule, but after the ethnic controversy they split from the other part of Georgia and became independent states. If we look back through the the statistical data we will see that Abkhazians made up a total of 1.8 percent of the population of all Georgia in 1989, and, with almost all members of the ethnic group living in Abkhazia, made up only 17.8 percent of the population of that region. Ossetians had made up three percent of the 1989 population: it is estimated that 120,000 Ossetians fled from South Ossetia to the Russian republic of North Ossetia in the midst of the fighting in South Ossetia in 1991, leaving just 45,000 in the region itself. Much of the Georgian population also fled into other parts of Georgia. According to statistic the conflicts in Abkhazia and South Ossetia in the early 1990s resulted in the displacement within Georgia of about a quarter of a million people. Precise figures are unknown, but it is thought there are about 230,000 internally displaced persons (IDPs) from Abkhazia and 12,200 from South Ossetia (Joann van Selm, 2005).

Georgian government set the relevant task concerning these problems. Georgian Ministry of Refugees with Georgian government aims to solve vital issues and set up crucial objections to achieve their goals. This is one of the five major migration challenges that confront Georgia as the country looks westward, towards the EU.

In order of their priority to the country and its international supporters, these challenges are:  
internal displacements from Abkhazia and South Ossetia as well as internal labor migration;  
return and integration of the deported Meskhetian population — the last of Soviet army's forced population movements still prevented from returning to their ancestral home;  
emigration from Georgia primarily to the EU;  
transit migration through Georgia and the associated border control issues;

the development of a Georgian immigration and asylum policy (Joann van Selm-2005).

### Different Ethnic Minorities in Georgia

As we underlined, Georgia is a multiethnic country and different ethnic groups live side by side peacefully. Here we give short and brief information about the groups inhabits in Georgia. Therefore, tolerance became main value in interethnic relationships as a guarantee of harmonious and conflict-free life among the local residents and people of different ethnic origins.

According to different censuses here we try to indicate the approximate number and percentage of ethnic groups reside in Georgia and therefore make the important part of countries multicultural life.

The first largest group inhabit in Georgia is ethnic **Russians (Doukhobors) - Primary Religion: Orthodox Christianity (confessional groups – Russian sects)**. Russian population sum up about 67 671 (1,5%) of total population (according to the 2002 census). As for many years, Georgia was a part of Russian Empire, later the Soviet Union, and the two countries share a common border, many Russians settled in various regions of Georgia. In recent years, the numbers of Russian living in Georgia is declining and now, according to 2014 census there are just 26, 453 Russians inhabited in country (Sarjeladze ,2009:36-37).

As it is mentioned above, Russian Empire had geographical interests in Georgia. Mainly, it was the reason of mass migration of Russians' to Georgia. The first Russian settlements appeared at the beginning of XIX century. There were the sects consisting mainly of members of Doukhobor (spirit wrestlers) religious group resided in Ninotsminda region. The sect called themselves Doukhobor (spirit wrestlers) were formed in the middle of XVIII century and they were in opposition with the official Russian Church, the emperor **Alexander I** issued the edict according to which Doukhobours exiling to different countries, including Georgia for their anti-religious, anti- state propaganda. Following the collapse of the Soviet Union many Georgian Doukhobor chose to return back to Russia and very few remain in Georgia.

**Armenians –Primary Religion: Christianity (Gregorian; partially Catholics)** live in different places of Georgia, but they are compactly represented in the Samtskhe-Javakheti region. Armenia is Georgia's neighbor country in the South and this fact impacts the migration dynamics and ethnic composition. During the invasions of their enemies at different times (of Arabs', Turks', Russians' and so on) Georgia became a natural shelter for Armenians (Sarjeladze, 2009:15-16). Samtskhe – javakheti region has a total population of 213, 700 people, it has been an Armenian populated region (54.6%) since the XIX century, with a various ethnic groups including Georgians mostly Ajarian eco migrants (43.35%), Greeks (0.36%), Russians (1.7%) and others. While in the capital, Tbilisi 82.6 thousand Armenians reside. Therefore, the integration process into Georgia's civil society has created difficulties for resulting in mutual understanding and thus it has been a challenge for Georgian government (Mateu, 2016:6).

The main problem in this region is language barrier. Minorities like Armenians, Russians, do not actually learn Georgian. The language of communication is Russian and Armenian. In recent years the infrastructure has greatly improved and the government has implemented different projects to solve this problem and overcome the barrier. Nevertheless, the issue remains everlasting and it represents a difficulty especially for education. In spite of the effort of the government, the education system did not change considerable. There are still several minority-language schools in Georgia. And they are traditionally two types of schools: Georgian language schools and Non- Georgian language schools (for Russians, Armenians, Azerbaijanians and other minorities). Hence, implementation of the new programs and projects are aimed at improving current situation (Mateu, 2016:13).

The Georgian government and its authorities have been taking efficient actions to change the difficult ethnic picture of the region. In early 1990's the first attempt had made, when Ajarian eco migrants from the mountainous areas of Ajara resettled in Santskhe-Javakheti region. Also numerous Georgian refuges and IDPs from Abkhazia and South Ossetia conflict regions were resettled in the same region. After this measure, the ethnic Georgian population in the district has grown five times, from 1,613 to 8,000. While Armenian population inclined five times. The Georgian government finances the resettlement process and at the same time tries to retain peace in the region (YERKIR – 2007:3).

**Ethnic Azerbaijanians - Primary Religion – Muslim (Sheets and Suits)** contribute 6.3 % about 284 761 people of Georgia's population. They are mainly inhabited in the border province of Kvemo Kartli. Poverty and unemployment make many Azeris leave their place of residence and move to Georgia to seek of better leaving conditions. But, unfortunately the standard of living is not much better than in their own country. Georgian government is not interested to promote their needs and demands, to develop the region and build new factories in the area where ethnic Azerbaijanians live. Thus, the region remains impoverished and they have to earn a living themselves.

Subsequently, their source of living largely is family farms and domestic agriculture. There are bazars in the villages or sometimes they go to the cities to sell their products to make a living and support their families.



The recent results of 2014 General Population Census also revealed a decline in the number and share of Azeri ethnic minorities from 284 761 persons, accounting for 6.5% of the total population of Georgia in 2002 to 233 082 persons, accounting for 6,3% in 2014. The key reasons of decreasing the number of Azeri population are less job opportunities, bad living conditions, poor medical care, unacceptable education system. Therefore, the migration rate is high, and they prefer to leave Georgia for the countries where they can afford better living.

Language barrier is the second problem for ethnic Azeris. Few Azerians speak Georgian, hence the lack of ability to speak Georgian language creates insurmountable difficulties to integrate in Georgian society, so they remain isolated and the process of integration is slow and in most cases ineffective.

The ethnic Azerbaijanians have increased their share of Georgian population despite the fact that their number has actually declined since 1989. In the last Soviet census of 1989, there were 307 556 ethnic Azerbaijanians in Georgia, whereas in the last Georgian census of 2014, there were 233 082.

However, the percentage of the ethnic Azerbaijanians in the population increased from 5.7% in 1989 to 6.3 % in 2014 because even more Georgians left the country than did ethnic Azerbaijanians (Huseynov:2018).

**Kurds**, they call themselves Yezids – **Primary Religion – Yezid** (Sect of Muslim religion, Kurds in Georgia are mostly Shia Muslims). It is a monotheistic religion, which has many elements of Mesopotamian religions, and at the same time it also has some similarities with Judaism and Islam. Kurds are indigenous people, who inhabit a mountainous region called Kurdistan, stretches across the borders of Turkey, Iraq, Syria and Armenia. They are one of the largest ethnic groups, without permanent homeland (Sarjeladze, 2009: 27-28).

Kurds have lived in Caucasus more than 100 years since their migration from Turkey and Iran. The first Kurdish tribes appeared in Georgia even from the XVI century. For many years, Kurds received harsh treatment from the Turkish authorities for generations. In 1920s- 1930s after the Brest – massive political and religious repressions started against Kurds in Turkey. Their costumes and language were banned and restricted. Most refugees moved to Georgia and different countries in order to find safe shelter. There were more than 33 333 (0.6%) thousands of Kurds in Georgia and they mostly resettled in the capital city Tbilisi. They have their own lands, farms and their life is better here, in Georgia considered of their country fellows in Turkey and Iran. But in the recent years many Kurds left Georgia for more developed countries, and according to the census their numbers diminished to some 2 514 (0.1%) thousands (*ibidem*).

**Jews – Primary Religion- Judaism** - the migration of Jewish people to Georgia has long and rich historic background. It can be dated back to around sixth century BC, when Nebuchadnezzar, the ruler of Babylon captured Jerusalem in 586 B.C. and Jewish people spread all over the world. Georgia was one of the countries, Jewish people resettled and began to live here peacefully. Mtskheta, the first and ancient capital of Georgia, was the destination for Jewish, where they had obtained tight and close relationship with Jerusalem. In towns and villages, where Jews settled, they had built synagogues, because they were the centers of their social life.

During the Mongol invasion, Jews from eastern Georgia moved to the western part of the country. They were mainly engaged in trade and lived peacefully among Georgian society for centuries. After the collapse of the Soviet Union in 1991, thousands of Jewish left Georgia for Israel. According to the latest census there are about 0,1% (3 772 thousand) Jews living in Georgia now, compared to 1990s, when Jews represented 0,5% of the population - 24 795 thousand people (WJC- world Jewish Congress,2019).

Ossetians belong to the North Iranian group of Indo-European peoples. They directly descend from Alans. Before Mongol invasion in XIII century, Alans lived in the lowland of Caucasus. The entire territory in the South Caucasus, which was populated by Ossetians was invaded by Kabardian tribes. Ossetians left the lowlands and moved to the Caucasian mountains to hide from the enemy. There they lead difficult life and in order to survive most of them became mountain pirates and caused serious problems to the mountainous population (Sarjeladze, 2009:19).

Ossetians settlement in Georgia has begun in the thirteen and fourteenth centuries. They are primarily Orthodox Christians with a small Muslim element. Until 1905 they formed in one national distinct. But after that period, they have been subjected numerous border changes and Soviet leader Joseph Stalin divided them between the North Ossetian Autonomous Republic in the Russian Federation and The South Ossetian Autonomous Region in the Soviet Socialist Republic of Georgia.

Relation between Georgians and Ossetians haven't always been easy. Century long ethnic conflict renewed in August 2008 where Georgian, Russian and South Ossetian troops struggled against each other. The victims were numerous and the number of displaced persons are still unknown. During the conflicts between Georgia and South Ossetia many Ossetians moved to Vladikavkaz, the capital of the Republic of North Ossetia-Alania in the Russian Federation. According to 2014 census, only 14 400 Ossetians live in Georgia, which is the half of the total number in 2002 (Shuxashvili, 2017).

As it is above mentioned, Ossetian population in Georgia has halved since 2002. A similar decline can be seen in those regions of Georgia, where Ossetian population was traditionally high. The same trend takes place in other remote regions of the country. Harsh economic conditions make Georgian citizens leave their homes and accordingly the migration rate is totally immense. The capital Tbilisi is the only city of the country where population grew rapidly(Edwards,2016).

In the last decade, there is a growing tendency to increase the numbers of Iranian citizens in Georgia. The relationship between these two countries goes back to centuries. Georgia, especially eastern part of the country was under the control of the Persian Empire for centuries. During these years Persian invaders captured thousands of Georgians and moved them to Iran. The imprisoned Georgians later played very important role in the Empire's civil, political and military fields (Mahdavi, 2018).

However, situation has changed drastically after that. In 2016, Iran and Georgia signed a visa-free travel agreement. As a result, numeral Iranians fleeing to Georgia. The main reason is economic interests. The fact that attracts many Iranians is cost of living. Compare to Iran, where the maintenance costs after the sanction imposed by the United States has become financially high, Georgia provides low and affordable living expenses. Furthermore, the latest census reveals that more than 323 000 Iranians settled in Georgia during the last months. As it is expected, their number could reach about one million at the end of 2019. They often buy lands, running a different business and gaining residence permits easily, that makes Georgia one of the most irresistible countries to live in (Mahdavi, 2018).

As we see from the article Georgia is a country of multicultural diversity. Where different ethnic groups coexist peacefully in one political space. Despite of the difficulties, various civil wars and conflicts our country faces for centuries, divers ethnic and religious classes continue to maintain general peace. Which is the greatest challenge and achievement of our society.

At the same time, Georgia also is the country of origin of migrants mainly flows toward Russian Federation, Greece, Germany, Turkey, United States and a number of other EU member states such as France, Spain and Italy. The 2002 Census shows that since the 1989 Census, Georgia lost almost 20 per cent of its population to emigration, which is really high rate for the country, whose population is just 3, 904,204. Majority of emigrants move to Russian Federation, that is defined the fact of close historical and geographical proximity (Chindea, 2008:11).

Turkey is another important route of destination for Georgian emigrants during last decade. After the war in 2008 and enclose of borders with Russia, Turkey officially instituted visa-free travel for Georgians, it became the second major country of destination for Georgian citizens.

The flow of emigrants from the different parts and urban areas tends to be directed towards Western Europe and the United States. Georgian nationals also continue to apply for asylum, mostly in Western Europe, with Germany, France, and Austria having the highest number of applicants in recent years Chindea, 2008:12).

## CONCLUSION

As we clearly see from the above article, Georgia is the country of rich multicultural and ethnic history. During its intercultural existence state has experienced numerous conflicting situation and civil wars, that affected its life. This has always characterized by the complexities and difficulties, but Georgian people and its government consistently express their desire and great will to build peaceful country. Where the representatives of all ethnic and national groups will be able to lead harmonious life. Therefore, their approach to this issue is often accurate and canonical. The ability to manage interethnic relations and the development of tolerant attitude are crucial in the building of democracy and civic society. It is extremely important to follow European standards step-by-step in order to maintain harmony and tranquility and develop tolerant community, for the farther hope to rebuild better future of multicultural Georgia.

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## BASIC GENERAL SCIENTIFIC RESEARCH METHODS IN HISTORICAL SCIENCE

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### ABSTRACT

The article discusses the issue of the application in historical studies of two pairs of general scientific methods of cognition - analysis and synthesis, induction and deduction. Examples of the use of these methods by the founders of the national historical science are given.

It is argued that the analytical method, which means dismantling, the dismemberment of the whole object into separate components, helps to highlight in the object of historical research primarily such problems as the development of economic and political relations, domestic and foreign policy, cultural processes, as well as political, public, scientific, pedagogical, entrepreneurial activities of historical characters. As for the synthesis, the application of this method in historical sciences implies the definition of the subject of the research (phenomenon), the selection of the necessary factual material and the disclosure of the subject of the study in accordance with the developed plot of the work.

Induction provides for the transition in the process of cognition from a separate knowledge to the general, from accumulated in the process of research reliable particular facts to the establishment of regularities of the historical process, the formulation of the laws of social development, which, in turn, contribute to the knowledge of individual phenomena, facts, processes, that is, serve as the basis for deduction, the transition from the general to the particular. Thus, the deductive method greatly facilitates and accelerates the process of historical cognition, and also provides for the study of a certain historical phenomenon in close connection with already known historical phenomena and processes.

**Keywords:** analysis, synthesis, induction, deduction, methodology, knowledge, historical sciences, historical process.

### STATEMENT OF THE PROBLEM

This article was written to help young scientists master the methodology of scientific research, the skills of applying basic research methods in writing scientific papers.

As practice shows, not all young scientists have enough knowledge of the methodology of scientific research or are not able to clearly define the methods of their research, to show how they applied them in their work. First of all, it concerns the general scientific research methods. Consequently, the relevant sections are often written formally, similar to each other.

The basics of scientific research methodology are devoted to monographs and textbooks of domestic scientists: E.V. Ushakov, V.S. Stepin, S.B. Kulikov, A.B. Ponomarev, A.M. Novikov, A.G. Krampit, etc. Historical scientists have made a huge contribution to the methodology of science, among them: M.A. Barg, I.L. Bisk, I.D. Kovalchenko, M.P. Kowalski, V.F. Kolomyitsev, B.G. Mogilnitsky.

The purpose of this article is to clarify the main general scientific methods - analysis and synthesis, induction and deduction - and the definition of their role and capabilities in historical research.

### RESULTS

Science is a sphere of human activity, which function is the development and theoretical systematization of objective knowledge of reality based on the knowledge of a researcher (the subject of the study) of certain facts, events, things, processes (the object of study). For this, a researcher uses different general scientific and special scientific methods, that have been created and have proven their usefulness and effectiveness in the process of scientific practice.

General scientific methods of knowledge used in all or in many, natural, technical and human sciences. At the same time, the use of two pairs of methods is obligatory in any scientific research: analysis and synthesis, induction and deduction, which are closely related and interact to each other and in this form are powerful tools for research in all scientific fields.

General scientific methods, such as analysis and synthesis (from the ancient Greek «analysis» – disassembly, dismemberment; «synthesis» – connection) are essential, as they follow from the very definition of science, which involves two interrelated processes: the study of the existing and the creation of the new.

Analysis is the mental or actual decomposition of whole objects into their constituent elements, further study, classification of the latter and, figuratively speaking, their placement on separate shelves according to certain properties, qualities, attributes [2, p. 33]. They can be in technical and natural sciences, for example, dimensions, function, color, shape, material, power, etc.; in the basic and human sciences – individual problems and issues.

A simple description of the phenomenon is not yet a science. In particular, it is impossible to call scientific works, for example, ancient Byzantine chronicles or chronicles of Rus, containing a description of various events in their chronological order. History as a science begins only when the object of research is clearly defined and a transition takes place from the use of a purely chronological form of lighting the past to a problem-chronological form, which involves the use of an analytical method. In modern historical science it is customary to single out such major problems as the development of economic and political relations, domestic and foreign policy of the state, cultural processes, etc. In all social sciences the forms of government, political regime, government, political systems, especially ideology in a particular society compared to others are also analyzed [3, p. 49].

The analytical method is widely used in historical works dedicated to individuals. Thus, the ancient Roman historian Guy Suetonius Tranquil in his fundamental work «The Life of the Twelve Caesars» described historical portraits of Julius Caesar and 11 first Roman princeps, each of them necessarily depicted on a general historical background, told about the origin of each ruler, about the early years of his life, about his public activities, then moved to private life, the properties of character, appearance [10]. Nowadays, when considering certain personalities, it is usually customary to single out such issues as the conditions of personality formation, political, social, scientific-pedagogical, educational, entrepreneurial (etc.) activities.

However, no matter how valuable and important the analysis is, it is in no way an end in itself of scientific research. It is the basis and material for the implementation of synthesis. If the task of the analytical method is to identify the internal structure of a specific object, then the use of synthesis, on the contrary, leads to the combination of components of a complex phenomenon, the creation of a new structure with a specific goal, a specific function and a certain plan of the researcher. In technical sciences this may be the creation of a certain mechanism, in the physical and mathematical sciences – the solution of a specific task, in the humanities, particularly in history, – the cover the phenomena that occurred in the past and which are commonly defined as the subject of historical research [1, p. 112]. Just as it is done in fiction, the subject of historical research is revealed by a certain plot. Indeed, unlike other sciences, history has certain signs of artistic creativity.

Another important pair of general scientific methods is induction and deduction. Induction (from the Latin «Induction» – guidance) is the transition in the process of knowledge from private knowledge to the general; from knowledge of a lesser degree of generality to knowledge of a greater degree of generality. In other words, it is a method of research and knowledge associated with the generalization of the results of observations and experiments. Induction reveals the mechanisms of general knowledge. A specific feature of induction is its probabilistic nature, that is, if the initial premises are correct, then the conclusion can only be reliably true, that is, induction does not guarantee the achievement of truth, but only “leads” to it. Every truth must be confirmed by practice [4, p. 213].

The accumulation of reliable facts in the process of cognition sooner or later leads to obtaining general judgments, establishing certain laws, generalizations, axioms, formulations of laws, the truth of which is proved by practice. The ultimate function of induction in the process of cognition is the development of scientific theoretical systems as a combination of facts, attitudes, and ideas explaining the phenomena of the material and spiritual worlds.

In turn, the patterns found on the basis of empirical facts and theoretical judgments, established axioms and developed theories further serve as the initial basis for new judgments and scientific research. The process of cognition goes in the opposite direction - not from individual facts to getting a general, that is, to getting a general picture of events, phenomena, processes, but vice versa - from the general knowledge of a certain system of things to the establishment of a separate, individual. This method is called deduction (from the Latin «deduction» – removal). In the simplest form, the following judgment is deductive: «All democratic states have a developed multiparty system. In the state «X» there was only one party. Country «X» was not democratic». Or this: «In legal states, the power acts exclusively within the Constitution and laws of the state, here the rule applies: «one law for all». This can't be said about the country «X». Country «X» is not a state of law».

However, it should be borne in mind that the truth of the result obtained depends directly on the truth of the initial general knowledge. The false or incomplete basis on which our judgments are based leads to erroneous judgments and results. Similar to the fact that the Russian ethno-historian Yu. D. Petukhov allowed, who in his work «The Original Sources of the Ruses» first expressed a dubious concept about the creation of the Rus by the gods as the first «super-ethnos» on earth, and then «sought» all over the world their descendants: in Mesopotamia, in Judea, in Ancient Egypt, in India, in Europe, etc. [8]. The basis of deduction must be strong and flawless, confirmed by obvious facts and proven practice.

Methods of induction and deduction are extremely important for historical science. Using the method of induction, the historian primarily examines material and written historical sources, on the basis of which he recreates the picture of the past, shows the vital activity of historical societies, the lives of individual personalities, historical processes and

phenomena. The method of deduction, firstly, allows the use of already acquired material – both own and alien – in the subject-practical cognitive activity, in the study of specific phenomena and facts. Thus, it greatly facilitates and accelerates the process of research. Secondly, deduction provides for the process of researching a certain historical phenomenon against the background of general historical processes. Thirdly, the deductive method allows you to make the right practical decision in a particular situation.

In addition to these general scientific and mandatory for any scientific research methods, in the development of science, a number of other general scientific methods have been created that are used by the researcher if necessary and are divided into empirical methods (experiment, measurement, observation, modeling, questioning, interviewing, testing, interviewing, etc.) and theoretical methods (mathematical modeling, system-structural, comparative, logical-linguistic, abstraction, idealization, historical, etc.). Each scientific branch has a methodological complex inherent only in it. However, recently the use of those methods that were previously considered characteristic of a particular scientific branch, in particular, borrowing certain methods from the methodological complex of mathematical sciences of the humanities and vice versa, has become especially fruitful. The tasks of a scientist are to choose the most effective and rational methods for his research in the entire large arsenal of methods. Or, in the absence of such, create your own.

## CONCLUSION

Historical sciences have their own special-historical research methods in their methodological arsenal, but two pairs of general scientific methods will always be central to any historical research: analysis-synthesis and induction-deduction, because they are essential in science, without their use only a simple collection is possible of facts. The examples given in this article indicate that the founders of national historiography skillfully and effectively used the designated methods, whose methodological experience is no less valuable than the content of their work.

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## VALUE OF MOLECULAR GENETIC MARKERS IN THE PROGNOSIS OF LOCALLY ADVANCED FORMS OF CERVICAL CANCER

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### SUMMARY

In biopsy preparations, there are 30 patients with cervical cancer at the IIb-IIIb clinical stages. A study in patients with locally advanced cervical cancer showed that a high expression level of VEGF and Ki67 proliferation in primary patients, elevated levels of p53 protein before carrying out correlate with an unfavorable prognosis, which makes it possible to use these indicators in monitoring the course of the disease. It was shown that prior to the initiation of antitumor treatment, the expression level of VEGF and Ki67 were as high as possible in those patients who subsequently showed progression of the disease, and reached 85%. The expression level of VEGF, Ki67 and p53 protein was shown to correlate with indicators of tumor progression.

**Keywords:** locally advanced cervical cancer, VEGF, Ki67, Bcl2, p53

Cervical cancer is one of the leading places in the structure of the incidence of the female population with malignant tumors of the genitals [5]. Despite the progress achieved in the diagnosis and treatment of this localization, an increase in the incidence and aggressiveness of its course is noted [10].

In 2017, the number of women with malignant processes in the population was the highest in cases of breast cancer - 9.9 per 100,000, cervical cancer - 4.8, and ovarian cancer - 2.4, respectively, per 100,000 female population. From 2013 to 2017, 7201 new cases of cervical cancer were detected in the Republic of Uzbekistan. The average incidence rate was 4.6 per 100,000 population. Cervical cancer I stage II in 2013 was diagnosed in 40.6% of cases, 51.6% in 2014, 63.2% in 2015, 62.3% in 2016 and 62.1% of cases in 2017. Although advances in the treatment of malignant tumors in the reproductive system have been achieved, the results remain unsatisfactory. From 2013 to 2017, the 5-year survival rate decreased from 45.3 to 42.6 per 100,000 population. Five-year mortality increased from 2.4 to 2.6 (cancer register).

The prognostic significance of the stage of the disease, the volume of the primary tumor, the presence of parametric invasion has been proven and recognized long ago. At the same time, the biological behavior of tumors remains sufficiently unpredictable even for patients with the same stage of the disease. Prognostic factors for cancer often are more important in terms of the outcome of the disease than the therapeutic effect. Immunohistochemical indicators are being actively studied as prognostic criteria for the effectiveness of treatment and the course of cervical cancer. These numerous immunohistochemical markers include markers that reflect the activation of oncogenes and suppressor genes, apoptotic and proliferative activity. Defects of genes that control DNA damage and cell proliferation play a special role in carcinogenesis [3].

Bcl-2 protein plays an important role in the regulation of apoptosis. It is known that this protein inhibits p53 dependent and independent apoptosis in cells with damaged DNA. In the work of I.I. Antoneyeva et al. (2012) showed a sharp and significant increase in expression in localized forms of cervical cancer compared with the initial stages (66.67% versus 33.3%) and the subsequent decrease in expression in the locally advanced process to 33.3% [1].

Recently, a concept has been actively developed, according to which mutant p53 has a negative dominant inhibitory effect on normal p53. Mice expressing mutant p53 have been shown to have more aggressive and metastatic tumors than mice lacking p53 or having normal p53 (Doyle et al., 2010; Lang et al., 2004; Morton et al., 2010; Olive and et al., 2004). In addition, patients with congenital missense - the p53 mutation (resulting in mutant protein expression) acquire cancer much faster than patients without p53 protein expression [2, 11].

The frequency of p53 accumulation increases with an increase in the malignancy of tumors, while with benign tumors there is no accumulation of mut-p53, and in malignant tumors the accumulation rate increases to 46% [9].



The results of the Russian Scientific Center of Radiology and Surgical Technologies (St. Petersburg) conducted a study of p53 oncoproteins in squamous cell carcinoma of the cervix II – III stage in patients before treatment and in the RT process (n = 80). It was revealed that p53 expression was observed in 30% of tumors before the start of treatment and in 49% - in the process of radiation therapy. A correlation between the expression of p53 before the start of treatment and the indices of general and disease-free survival was found: with high expression, 5-year survival was 53%, with its absence or low expression - 67%. The twenty-month relapse-free survival rate for p53 expression was 65%, and in its absence, 81%. Thus, p53 overexpression can be considered as a predictive factor in radiation treatment of cervical cancer.

One of the most studied indicators of tumor growth aggressiveness is cell proliferation, which can be assessed using the mitotic index and the Ki-67 index. The Ki-67 antigen is expressed in almost all phases of the mitotic cycle, and in accordance with this reflects the proliferative pool of a tumor. The proliferative index Ki-67 is considered as an independent prognostic indicator of the occurrence of relapse, general and relapse-free survival, a predictive factor for determining sensitivity to chemotherapy and radiation therapy [8].

Currently, there is no consensus on the effect of Ki-67 on the radiosensitivity of cervical tumors, on the critical prognostic level of proliferative activity of cervical cancer and its connection with the clinical and morphological factors of the prognosis and outcome of the disease [4]. All the above requires further research in this direction. Due to the fact that between 5 and 45% of patients die after radiation treatment for 5 years, the prediction of the results of combined radiation therapy is an important practical task [6].

Vascular endothelial growth factor (VEGF), originally known as vascular permeability factor (VPF) [7] is a signal protein produced by cells that stimulates the formation of blood vessels. To be specific, VEGF is a sub-family of growth factors, the platelet-derived growth factor family of cystine-knot growth factors. They are important signaling proteins involved in both vasculogenesis (the de novo formation of the embryonic circulatory system) and angiogenesis (the growth of blood vessels from pre-existing vasculature).

**The aim** of the study was: In accordance with the purpose of the study outlined above, the expression level of molecular biological markers VEGF, Ki67, Bcl2, p53 and their prognostic value in patients with locally advanced cervical cancer who received complex treatment were assessed.

## MATERIAL AND METHODS

30 patients with locally advanced cervical cancer with IIB – IIIA-B stage who received chemoradiotherapy in Cancer Center from 2014 to 2017 were examined. The stages of the disease before the start of treatment were carried out in accordance with the international classification of TNM (7 th revision 2009) and in accordance with the classification of the International Federation of Obstetricians-Gynecologists classification (FIGO, 2011). The diagnosis of the disease in all cases verified histological. Morphologically, all women were diagnosed with squamous cell carcinoma. The possibilities of the proliferative activity marker Ki67, p53 protein, Bcl2 in determining the prognosis of the disease, locally advanced cervical cancer were studied. The material of the study was cervical tumor tissue obtained from 30 patients. The age of 72.4% of patients accounted for 4-5 decades of life.

All patients underwent 3 courses of neoadjuvant polychemotherapy with 21 day intervals, according to the scheme: Cisplatin 100 mg 1 day, Fluorouracil 1000 mg 1-4 days. Then, after computerized topometry of the pelvic organs, planning of combined radiation therapy was carried out, including remote gamma therapy and intracavitary brachytherapy. Remote irradiation was carried out on a gamma therapeutic apparatus (TERABALT type 80 model SCS 2012 Czech Republic) in the standard fractionation mode (daily 5 times a week Single Focal Dose 2 Gy to Total Focal Dose 46 Gy). Intracavitary radiotherapy was performed on a BEBIG brachytherapy device - MULTISOURCE Co60 2013. (Germany) in fractional mode Single Focal Dose 5 Gy, eq Total Focal Dose to point A up to 70-90 Gy, to point B 50-58 Gy.

The initial expression of the listed immunohistochemical markers in the tumor and prior to chemo-radiotherapy was evaluated. The immunohistochemical study was carried out according to a standard procedure on dewaxed sections of cervical tissue blocks obtained from resection specimens or cervical biopsies. A pathologist to clarify the histological diagnosis and the correspondence of the blocks to the selected sections reviewed all drugs.

Evaluation of staining results was performed using a Carl Zeiss Microlmaging light microscope (Germany). For all markers, the localization of staining in the cell (nucleus, cytoplasm, membrane) was evaluated. The results of immunohistochemical analysis were evaluated quantitatively and qualitatively by the intensity of cytoplasmic staining: 0 — no staining, 1 — weak staining, 2 — medium-intensity staining, 3 — strong staining. The percentage of stained cells (from 0 to 100%) and their content in the most saturated layers of the epithelium were quantified.

The immediate results of chemoradiotherapy were evaluated using the RECIST (Response Evaluation Criteria In Solid Tumors) scale. Evaluation of the objective response was confirmed by the results of clinical, ultrasound and MSCT / MRI studies.



## RESULTS AND DISCUSSION

In all patients, cervical squamous cell carcinoma was verified, of them 17 (14.16%) was diagnosed with stage IIb, 8 (6.66%) had stage IIIa, and 5 (4.16%) had stage IIIb of the disease

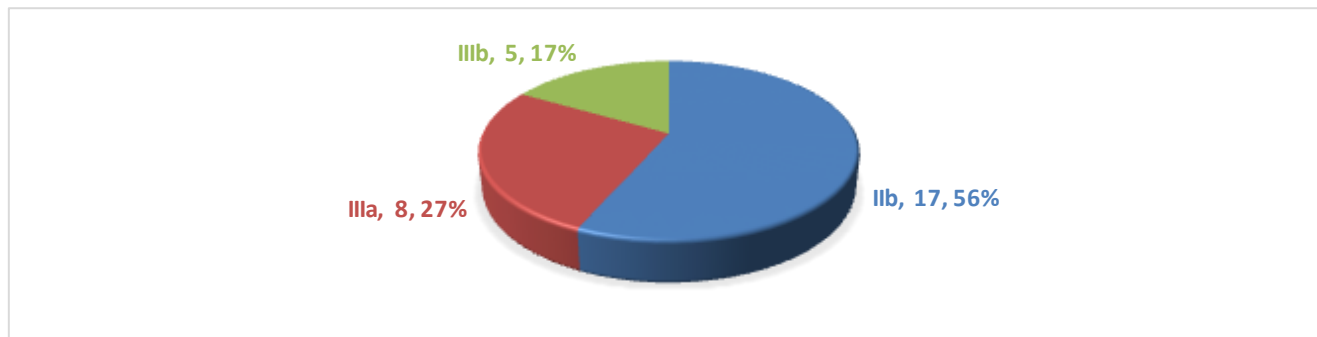


Figure The contingent of patients of the two study groups according to the stages of the disease.

G3 was observed in 17, G2 - in 8 patients (Table 1).

Table 1. Differentiation of tumors by locally advanced cervical cancer.

Total	n- 30		
	IIb	IIIa	IIIb
<b>G 1</b>	0	0	0
<b>G 2</b>	5 (4,16%)	1 (0,83%)	2 (1,66%)
<b>G 3</b>	9 (7,5%)	6 (5%)	2 (1,66%)
<b>G 4</b>	3 (2,5%)	1 (0,83%)	1 (0,83%)
	17 (14,16%)	8 (6,66%)	5 (4,16%)

## RESULTS

A comparative immunohistochemical analysis of cervical cancer (biopsy preparation) was performed. The results of the performed immunohistochemical analysis are based on the difference in the expression of a group of proteins associated with tumor suppression and cell proliferation. The proportion of proliferating cells was assessed by the level of expression of antibodies to the nuclei of cells that produce VGF, Ki-67, Bcl-2 and p53.

As a result of VEGF assessment, the following data were obtained: Epidermal growth factor receptors affect growth and regeneration of the cervical mucosa, and can also be directly associated with the progression of locally advanced forms of cervical cancer. Patients with locally advanced cervical cancer with a high level of VEGF expression at the G-2 and G-3 stages of the process have a poor prognosis regarding the detection of metastases and recurrence of the disease.

Table 2. The study of the relationship of the level of differentiation of the tumor and high expression of VGF in patients with locally advanced forms of cervical cancer

Differentiation of squamous cell carcinoma	I Group (n=30)	
	aбс.	%
G-1	0	0
G-2	5 (8)	16,6%
G-3	11 (17)	36,6%
G-4	3 (5)	10%
Total	19	63,3%

With the help of proliferation markers (study of Ki-67 protein and mitotic index), a differential diagnosis between severe dysplasia and highly differentiated squamous cell carcinoma of the cervix was made. A significant increase in the proportion of dividing cells in the foci of moderate and severe dysplasia compared with unchanged mucosa was shown. With a decrease in the degree of differentiation in squamous carcinomas, the proportion of proliferating cells significantly increased. In the study of Ki-67 patients in group 1, a positive reaction with the progression of the process and the risk of recurrence in 20 (66.6%) of 30, which increased depending on the degree of differentiation of the tumor.

Table 3. The study of the relationship of the level of differentiation of the tumor and high expression of Ki-67 in patients with locally advanced cervical cancer

Differentiation of squamous cell carcinoma	I group (n=30)	
	aбс.	%
G-1	0	0
G-2	3 (8)	10%
G-3	13 (17)	43,3%
G-4	4 (5)	13,3%
Total	20	66,6%

The study of p53 expression showed that a positive reaction was determined in 70% of locally advanced cervical cancer cases, the detection was a brown color of the nuclei. In the study of p53 in patients of group 1 with the progression of the process and the risk of recurrence in 21 (70%) of 30, thus, p53 overexpression can be a prognostic factor in the occurrence of recurrence of the process, which must be considered in each case.

The increase in proliferative activity in squamous cell carcinoma of the cervix may be due to even more pronounced mutations and / or blockade of the oncosuppressor gene of the wild type p53, which plays a central role in the development of apoptosis.

A correlation was found between an increase in Ki67, p53 expression and blocking of apoptosis in locally advanced cervical cancer.

In the study, a positive response to the p53 tumor marker was observed mainly in the differentiation of G-3 (40%). At the same time, in patients with locally advanced cervical cancer, in whom a relapse of the disease was detected in the next 3 years of observation, the level of p53 expression was as high as possible.

Table 4. The study of the relationship of the level of differentiation of the tumor and high p53 expression in patients with locally advanced cervical cancer

Differentiation of squamous cell carcinoma	I group (n=30)	
	aбс.	%
G-1	0	0
G-2	5 (8)	16,6%
G-3	12 (17)	40%
G-4	4 (5)	13,3%
Total	21	70%

Evaluation of bcl-2 expression was carried out in visual fields with magnification (x400), based on the percentage of stained cells semi-quantitatively (objective 40), based on the prevalence and intensity of the immunohistochemical reaction (no expression or less than 10% of cells were stained - 0 points, from 10 to 25 % - 1 point, from 26 to 50% - 2 points, from 51 to 75% - 3 points and more than 75% - 4 points. The patients subsequently showed relapses, high expression of this tumor marker was detected in 65.4% of cases.

Table 5. The study of the relationship of the level of differentiation of the tumor and high expression of bcl-2 in patients with locally advanced cervical cancer

Differentiation of squamous cell carcinoma	I group (n=30)	
	aбс.	%
G-1	0	0
G-2	3 (8)	10%
G-3	9 (17)	30%
G-4	2 (5)	6,6%
Total	14	46,6%

The proliferative activity of tumor glandular epithelial cells was assessed using Ki-67 (nuclear staining) and was assessed as low with a damage index of 0-20%, medium - 21-50%, high - 51-100%.

With the help of proliferation markers (Ki-67 protein and mitotic regimen), a differential diagnosis was made between severe dysplasia and squamous cell carcinoma. A significant increase in the proportion of dividing cells in the foci of moderate and severe dysplasia was shown. There was a significant increase in proliferative activity in squamous cervical cancer in comparison with foci of severe dysplasia.

With a decrease in the degree of differentiation in plum cell carcinoma, the proportion of proliferating cells significantly increased.

According to the data obtained, in patients with locally advanced cervical cancer - 10% of patients had a low PI, 43.3% had a moderate PI, and 13.3% had a high one.

The study of proliferative activity on the expression of the Ki-67 antigen in the cervix. A diagnostically significant marker in determining proliferative activity in our studies was the Ki-67 antigen; its expression was detected in 17% of patients with locally advanced cervical cancer

Counting cells with Ki-67 expression in fields chosen arbitrarily may lead to an underestimation of the proliferative activity of the tumor, which is confirmed by the results of the study. Gender differences in proliferative activity were not observed. The increase in proliferative activity in squamous cell carcinoma of the cervix may be due to even more pronounced mutations and / or blockade of the wild-type (wt) p53 tumor-suppressor gene that plays a central role in the development of apoptosis.

VEGF overexpression is observed in most cases in low-grade tumors (G3); an increase in the production of this protein in large tumors has also been found. An association of the overexpression of VEGF with an increase in the process stage has also been established.

As a result of the VEGF -status assessment, the following data was obtained: overexpression of this protein (3+), indicating amplification of the corresponding gene in tumor cells, as in G-2, expression was detected in 16.6% with metastases in regional lymph nodes. Thus, there is a tendency to increase the expression of VEGF with increasing stage of the disease, including a more noticeable, in the presence of metastases in regional lymph nodes.

A high level of expression of Bcl-2 was observed in 46.6% of patients with relapse MRSRM.

Epidermal (VEGF) growth factor receptors affect growth and regeneration of the intestinal mucosa, and can also be directly related to the progression of locally advanced cervical cancer. An unfavorable prognosis was noted in patients with locally advanced cervical cancer with a high level of VEGF expression.

Thus, the expression of a number of proteins in the comparison groups in patients with relapse development was studied, which can play a role and be predictors and prognostic criteria for staging the process and the possibility of metastasis and recurrence.

The morphological signs of the prognosis of the disease during locally advanced cervical cancer were determined the most informative factors are the degree of differentiation of the tumor, the level of invasion, germination of the tumor. The size of the tumor is directly correlated with the probability of detecting locally advanced cervical cancer and invasion into the cervical layer.

Based on the studied molecular characteristics of locally advanced cervical cancer, criteria were developed to identify cases of locally advanced cervical cancer with an increased risk of recurrence and metastasis. For the first time in locally advanced cervical cancer, a correlation between the expression of suppressors of proliferation and apoptosis has been studied. The study of the expression of protein markers in the primary tumor revealed their importance in predicting the outcome of the disease of locally advanced forms of cervical cancer with the choice of performing a possible surgical intervention.

In the tasks of the research, it was necessary to study and qualitatively evaluate the prognostic factors of tumor markers that play a direct role in the carcinogenesis of locally advanced forms of cervical cancer. In connection with this immunohistochemical method, the following markers were studied: Ki-67, p53, VEGF, Bcl-2. Below is shown in which the levels of change of the proliferation differentiation markers are shown.

Table 6. The levels of changes in the expression of tumor markers in patients with locally advanced forms of cervical cancer immunohistochemistry study (n = 30)

Expression	Oncomarkers							
	Ki-67		p53		VEGF		Bcl-2	
	aбс.	%	aбс.	%	aбс.	%	aбс.	%
Positive	17	56,7	21	70,0	19	63,3	14	46,7
Moderate	3	10,0	-	-	-	-	-	-
Negative	10	33,3	9	30,0	11	36,7	16	53,3

As clearly seen, from the table, positive expression of the mutant p53 gene was observed in 21 (70.0%), Ki-67 - 17 (56.7%) patients, while the level of VEGF oncoprotein and Bcl-2 was positive in 19 (63.3%) and 14 (46.7%), respectively, but the most negative expression of Bcl-2 was observed - 16 (53.3%).

The expression of these genes is considered as an unfavorable prognostic trait at various localizations, and contributes to the emergence of drug resistance to various chemotherapeutic drugs (Zaridze DG 2004).

Table 7. Changes in the level of tumor markers in patients with locally advanced forms of cervical cancer depending on the stage (n = 30)

Marker	Expression	IIb		IIIa		IIIb	
		Aбс	%	Aбс	%	абс	%
p53	positive.	9	52,9	7	87,5	5	100,0
	Negative	8	47,1	1	12,5	0	0,0
VEGF	Positive	8	47,1	6	75,0	5	100,0
	Negative	9	52,9	2	25,0	0	0,0
Bcl-2	Positive	11	64,7	1	12,5	2	40,0
	Negative	6	35,3	7	87,5	3	60,0
Ki-67	High	7	41,2	6	75,0	4	80,0
	Moderate	1	5,9	1	12,5	1	20,0
	Negative	9	52,9	1	12,5	0	0,0

## SUMMARY

The study showed the statistical reliability and significance of the studied immunohistochemical markers. Thus, it was shown that relapses of locally advanced forms of cervical cancer occur much more frequently in the group of patients with a high proliferation index, while the proliferative activity is more than 50% with locally advanced forms of cervical cancer is an unfavorable prognostic factor. Studied p53 expression allows predicting the outcome of the disease and the effectiveness of treatment, while overexpression is a sign of the presence of a high risk of developing relapses, activation of metastasis and, accordingly, a low level of survival of patients.

In the absence of p53 expression in the primary tumor in patients with locally advanced forms of cervical cancer, the risk of recurrence is reduced to a minimum, and survival increases.

A study of the expression of VEGF in locally advanced forms of cervical cancer found that VEGF overexpression is an independent adverse predictor of locally advanced forms of cervical cancer. This protein is more often detected in G3-4, and the level of its expression increases at stage III of all variants of cervical cancer. VEGF protein can be considered as a potential prognostic marker for squamous cell carcinoma of the cervix uterus, since its expression level is significantly associated with the stage, and with the degree of tumor differentiation.

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## ACCESSIBILITY AND EFFICIENCY OF USING LEARNING MANAGEMENT SYSTEMS IN THE HIGH EDUCATION (Moodle, Canvas, Its learning)

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### ABSTRACT

The article is devoted to the effective impact of the Learning Management System (LMS) in the high education. LMS allows choosing rational learning tools, combining traditional and innovative approaches to student and teacher personal development, organized independent work of students in the high level, providing an opportunity for the educational process to be individual, to create video collections, presentation. LMS is a specific application for documentation, administration, reporting. It's important to use LMS in the education, because it will help to improve the process of interaction between the student and the teacher. Today there are many suppliers of LMS. However, we turn to the most used ones (Moodle, Canvas, Its learning).

**Key words:** Learning Management System (LMS), high education, Moodle, Canvas, Its learning.

### Introduction

The globalization in the modern world is primarily due to the growth of knowledge. Therefore, digital technologies require improvement, rethinking according to the challenges of our time. In an era of modernization important to use digital technology in all aspects of life (we use them at home and work, when ordering tickets and paying bills, etc.). In our days the process of using digital technology in all areas is very relevant. World's information trends emphasize the fact that e-education is popular, and this requires teachers and students to be seriously prepared and responsive to the teachings of a modern informative society. Digital technology allows us to be independent, develop critical thinking, save time, successfully combine various means, methods of teaching and perform tasks, regardless of time, place and opportunity. In the high educational used **Learning Management System (LMS)** or **Digital Learning Platforms (DLP)**. This system is used to plan, conducted and evaluate learning processes. LMS is an integral part of the educational process. This, in our opinion, ensures the effectiveness of training, makes it more interesting and modern. It is important to use certain systems that could have online courses, classroom course schedules and descriptions, tracking, and instructor and facilities scheduling [14].

LMS and their effectiveness was researched in many countries ([1], [2], [3], [4], [7], [9] [10], [12], [15], [18]). Numerous scientific researches show that the using LMS is a topical in the modern life, «past decade has seen enormous growth in the use of learning management systems (LMS) in higher education institutions, with varying levels of support provided to staff and students during the implementation phases».

For this reason Gåsland (2011) convinces: LMS is an important success factor for these systems, they are easy to use. The teacher is considered learnings platforms as the one who «holds the knowledge», transmits it to students, foster their learning [8].

Another researcher Dobre (2015) accentuates that «the future belongs to LMSs, considering that the modern higher education demands the fulfillment of some critical requirements in order to be successful».

LMS, according to Lopes (2014), give possibilities to systematize basic tasks. Moreover, stresses the author, assessments can be straightaway delivered to the student, and upon conclusion, immediately returned with grades and detailed feedback. Therefore LMS can also be used for assessment purposes in Higher Education [15].

### Moodle, Canvas, Its learning

Important to say, that many universities have already an LMS [13]. According to statistics (the largest number of users – 142,106, 528), the biggest digital learning planform is **Moodle** [16]. Moreover, the most popular features of Moodle are: True Open Source, Powerful, flexible and collaborative learning, Easy communications, Accurate grading, Easy course editing, Data-driven decisions, Full integration, Latest multimedia tools, Extendable & customizable, Safe and secure [16]. These features make it easy to use LMS Moodle.

(Screenshot 1, Retrieved from <https://moodle.com/features/>)



Pedagogical platform *Moodle* is used for high education in many countries (Argentina, Australia, Brazil, Canada, Spain, United Kingdom, France, Italy etc.). In Ukraine also many institutions use the learning platform *Moodle*. According to the Ukrainian scientist Shcherbyna (2015), Moodle platform are free to use to evaluate any competencies. The researcher is turning also to the benefits of using LMS Moodle [19]. The necessary condition for its application, notes the scientist, is the development and constant updating of the nomenclature of industries, competencies and points of the repository. The nomenclature of industries and competences should be developed at the level of national standards of higher education and be in line with international standards. Educational institutions can be involved in the development of points for assessing competencies. It allows taking into account local peculiarities of the organization of the educational process [19].

Another Ukrainian scientist – Myshchychshen (2011) – points out the disadvantages of using the platform Moodle [17]:

- ✓ not adapted to create complex educational work;
- ✓ poorly integrated with external programs;
- ✓ does not contain bibliographic education and planning of training in the specialty;
- ✓ has somewhat limited communication capabilities;
- ✓ the absence of such technical support from the manufacturer.

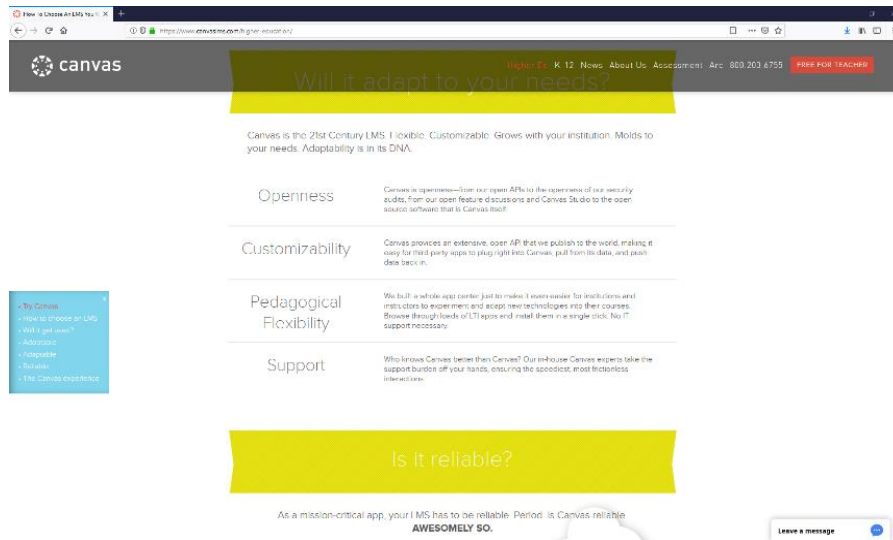
The author also points out that there is an urgent need to change the strategy of distance learning, in particular in improving the qualification in the process of using information technology based on the learning platform Moodle. Therefore, the formation and development of the professional competence of teachers and students using the information system Moodle helps to integrate and improve the content, tools, methods and forms of learning [17].

LMS «**Canvas**» and «**Its learning**» wide use in the Norwegian high education. «Canvas» was founded in 2008. Canvas used by more than 3000 universities, school districts, and institutions around the world. This suggests that «Canvas» is designed for students to become more efficient in the methods of communication, discussion, collaboration, and assessment through online learning, «pushing» global society forward [20].

Digital learning platform «Canvas» has the following *advantages* [11]:

- ✓ **Openness** (openness of our security audits).
- ✓ **Customizability** (free publish, easy for using).
- ✓ **Pedagogical flexibility** (to making it easier for institutions and instructors to experiment and adapt new technologies into their courses).
- ✓ **Support**.

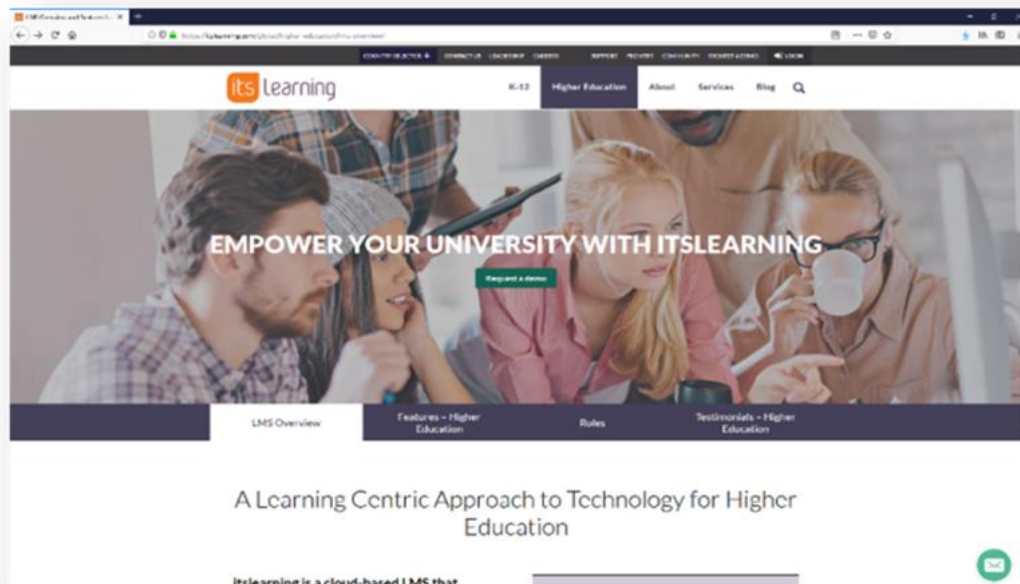
(Screenshot 2, Retrieved from [https://www .canvaslms.com](https://www.canvaslms.com))



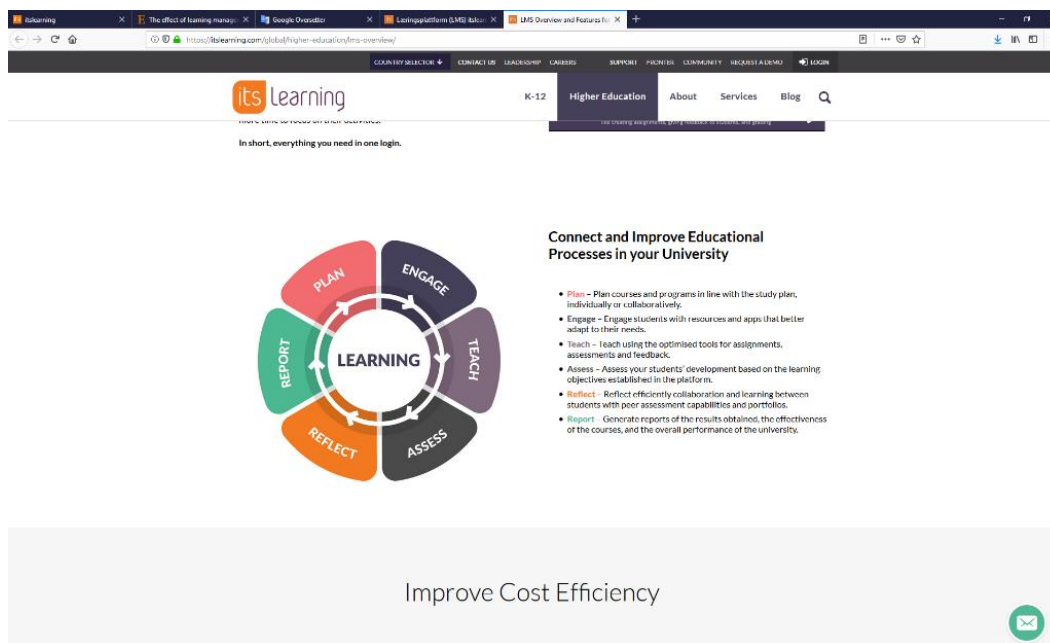
LMS «Its learning» helps teachers and students in six key points [6]:

- ✓ **Planning** of the educational process
- ✓ **Engaging** students with resources and apps. They are built according to the needs of students.
- ✓ **Teaching** and using the optimized tools for assessments and feedback.
- ✓ **Assessing** students based on the learning objectives.
- ✓ **Reflecting** efficiently collaboration between students and teachers (with peer assessment).
- ✓ **Formation** of reports on the results obtained (effectiveness of the educational process and overall productivity of the institution).

(Screenshot 3, Retrieved from <https://itslearning.com>)



(Screenshot 4, Retrieved from <https://itslearning.com>)



**CONCLUSIONS**

As can be seen, digital technology in our time plays very important role. In education especially effective to use LMS (gain knowledge and save time, create new projects, communicate with others). We emphasize that LMS demonstrates advantages due to in formativeness, accessibility, especially economic efficiency. It also requires less time and energy to absorb knowledge, more mobility and comfortable.

The benefits of using LMS can be graphically depicted as follows (see Table 1):

Table 1

Advantages of using LMS		
Ability to study at a convenient time	Ability to study in any place	Accessibility of training materials
Independence in solving set tasks	Comfortable learning conditions	Constant communication between the teacher and the student
Mobility (accessibility and efficiency)	Using of various methods and means of training	Possibility of active organization of each student

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## SYNTHESIS AND BIOLOGICAL ACTIVITY OF 2,3,4,6-TETRA-O-ACETYL-1-O-(2-CHLORO-3-PHENYL THIO PROPYL)- $\beta$ -D-GALACTOPYRANOSE

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### ABSTRACT

We studied the reactions of acetylaryl glycosides with phenylsulfonyl chloride in the presence of a benzoyl peroxide catalyst. A new sulfur-containing glucoside was synthesized: 2,3,4,6-tetra-o-acetyl-1-O-(2-chloro-3-phenyl thio propyl)- $\beta$ -D-Galactopyranose (3).

The bactericidal properties of  $\beta$ -O-(2-chloro-3-phenyl thio propyl)-D-Galactopyranose (4) of the obtained product after deacetylation were studied. With the help of the computer program PASS (Prediction of Activity Spectra for Substance) onlines were able to predict the range of activity of substances. The obtained result established correlations on bactericidal properties between biological activity and the intended biological activity. The structure of the synthesized compounds was determined by physico-chemical research methods.

**Keywords:** Alliglycosides, acetylation, benzoyl peroxide, phenylsulfonyl chloride, biological activity.

### INTRODUCTION

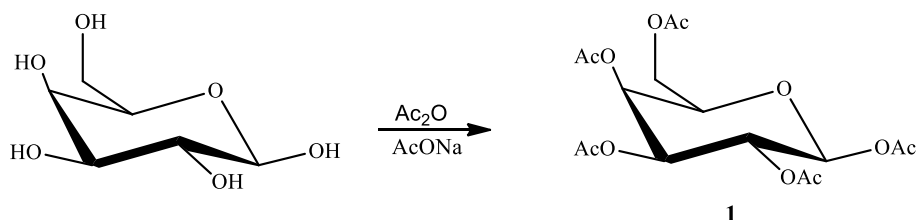
Important compounds of carbohydrate origin are thioglycosides. Recent studies have shown that these compounds are characterized by very significant biological activity and are included in the composition of vitamins, enzymes and coenzymes. All organisms need sulfur [1-3], which it absorbs, in the form of any need. Sulfur-containing compounds are used as an antispasmodic effect, as well as an extension of the capillaries.

For the synthesis of sulfur-containing galactose, the reaction of the addition of monosaccharides (galactose) with phenylsulfonyl chloride was first studied. The starting compounds are synthesized by known methods. [4-6].

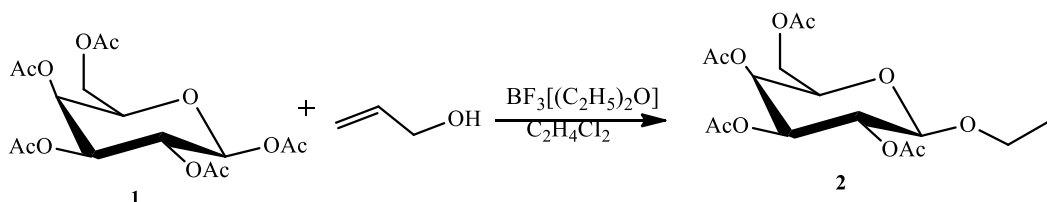
**Experimental part.** With acetylation of galactose with acetic anhydride in the presence of sodium acetate on the obtained  $\beta$ -acetylated product (1) by the action of allyl alcohol and  $\text{BF}_3[\text{O}(\text{C}_2\text{H}_5)_2]$  was synthesized 1-O-allyl-2,3,4,6-tetra-o-acetyl- $\beta$ -D-galactopyranose (2). A new compound 2,3,4,6-tetra-o-acetyl-1-O-(2-chloro-3-phenyl thio propyl)- $\beta$ -D-galactopyranose (3) was synthesized at room temperature in chloroform, in the nitrogen region, with mixing and adding phenylsulfonyl chloride solution (in  $\text{CCl}_4$ ).

The synthesized compounds are white colored crystals, very soluble in chloroform. The composition of the derivative was determined by physico-chemical research methods.

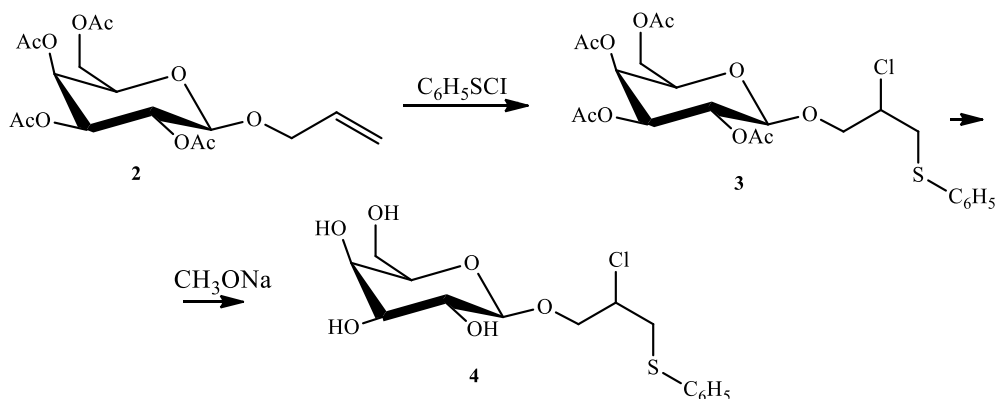
In particular, the definition of optical rotation, using elemental analysis, IR and  $^{13}\text{C}$  Spectroscopy. The purity of the substance was checked using thin-layer chromatography using "Silufof" plate in the following solvent system by volume: chloroform-ethanol 2:1. Optical rotation was measured on a SU-3 universal saccharimeter at  $20^\circ\text{C}$ . IR spectra of the samples were taken on a UR-20 spectrometer in KBr tablets.  $^{13}\text{C}$  NMR was recorded on a Bruker AM-300, 75.5 MHz spectrometer in deuteriochloroform:



Allyl-2,3,4,6-tetra-O-acetyl- $\beta$ -D-galactopyranose (2) was obtained in the interaction of penta-O-acetyl- $\beta$ -D-galactose (1) with dichloroethane and with allylic alcohol with catalyst  $\text{BF}_3[(\text{C}_2\text{H}_5)_2\text{O}]$ :



By dissolving Allylated monosaccharides at room temperature in chloroform in the nitrogen region, in constant movements with the addition of a solution of phenylsulfonyl chloride ( $\text{C}_6\text{H}_5\text{SOCl}_2$ ), a new compound was synthesized - 2,3,4,6-tetra-o-acetyl-1-O-(2-chloro-3-phenyl thio propyl)- $\beta$ -D-galactopyranose (3) 51.8% with output, from which de-acetylation were obtained 1-O-(2-chloro-3-phenylethiopropyle)- $\beta$ -D-galactopyranose (4).



With the help of computer program PASS Online [7-8-9]. PASS (Prediction of Activity Spectra for Substances) Online predicts over 4000 kinds of biological activity, including pharmacological effects, mechanisms of action, toxic and adverse effects, interaction with metabolic enzymes and transporters, influence on gene expression, etc.

Computer program Evaluated Estimated Biological Activity 2,3,4,6-tetra-o-acetyl-1-O-(2-chloro-3-phenyl thio propyl)- $\beta$ -D-galactopyranose (3) (Table 1.) and his deacetylated product-1-O-(2-chloro-3-phenylethiopropyle)- $\beta$ -D-galactopyranose (4) (table 2).

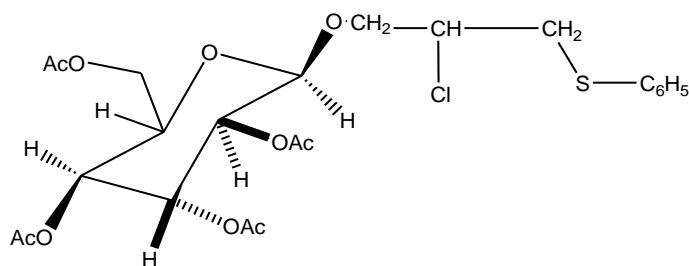


Table 1.

**2,3,4,6-tetra-*o*-acetyl-1-*O*-(2-chloro-3-phenyl thio propyl)- $\beta$ -D-Galactopyranose (3)****(Pa>Pi ; Pa>0,5)**

Activity	Pa*	Pi**
Benzoate-CoA ligase inhibitor	0,901	0,005
Cholesterol antagonist	0,851	0,004
Antineoplastic	0,847	0,007
Antileukemic	0,796	0,004
CDP-glycerol glycerophosphotransferase inhibitor	0,812	0,027
Membrane permeability inhibitor	0,753	0,020
Antineoplastic (breast cancer)	0,731	0,005
Antineoplastic (cervical cancer)	0,709	0,004
Mannotetraose 2- $\alpha$ -N acetylglucosaminyltransferase inhibitor	0,699	0,027
Immunosuppressant	0,679	0,019
Antifungal	0,639	0,014
Prostate cancer treatment	0,618	0,005
Alkenylglycerophosphocholine hydrolase inhibitor	0,632	0,041
Antibacterial	0,566	0,011
Mycothiol-S-conjugate amidase inhibitor	0,565	0,013
Beta glucuronidase inhibitor	0,571	0,020
Nicotinic $\alpha$ 4 $\beta$ 4 receptor agonist	0,594	0,043
Angiogenesis stimulant	0,550	0,008
Hypolipemic	0,554	0,029
Anaphylatoxin receptor antagonist	0,557	0,049
CYP2H substrate	0,576	0,079
Sugar-phosphatase inhibitor	0,534	0,073

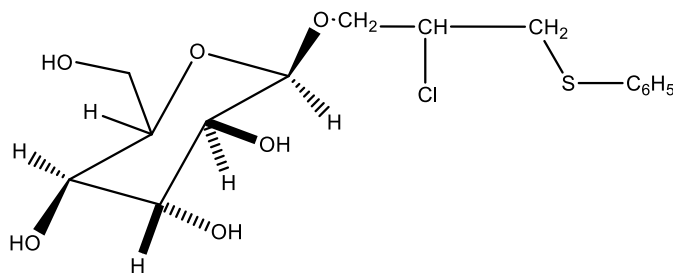


Table 2.

**1-*O*-(2-chloro-3-phenyl thio propyl)- $\beta$ -D-galactopyranose (4) Predicted activity spectrum****(Pa>Pi ; Pa>0,5)**

Activity	Pa	Pi
Benzoate-CoA ligase inhibitor	0,956	0,002
Alkenylglycerophosphocholine hydrolase inhibitor	0,956	0,002
Sugar-phosphatase inhibitor	0,927	0,003
Cholesterol antagonist	0,923	0,002
Anthranilate-CoA ligase inhibitor	0,914	0,002
CDP-glycerol glycerophosphotransferase inhibitor	0,909	0,008
Fucoesterol-epoxide lyase inhibitor	0,881	0,004
Licheninase inhibitor	0,877	0,001
Mycothiol-S-conjugate amidase inhibitor	0,834	0,002
Antileukemic	0,793	0,004
Antitoxic	0,770	0,004
Protein-tyrosine sulfotransferase inhibitor	0,766	0,003

Antineoplastic	0,771	0,015
Membrane permeability inhibitor	0,753	0,020
Vasoprotector	0,746	0,008
Angiogenesis stimulant	0,722	0,003
Sweetener	0,717	0,002
Cytostatic	0,714	0,009
Antineoplastic (cervical cancer)	0,708	0,004
Membrane permeability inhibitor	0,718	0,032
Antithrombotic	0,679	0,009
Lipotropic	0,659	0,005
Hepatoprotectant	0,641	0,010
Antineoplastic (breast cancer)	0,632	0,008
Beta glucuronidase inhibitor	0,612	0,012
Antifungal	0,602	0,018
Chitosanase inhibitor	0,591	0,007
Prostate cancer treatment	0,579	0,005
Antiinfective	0,574	0,015
Antibacterial	0,532	0,014
Antimetastatic	0,532	0,014
Immunostimulant	0,545	0,030
Antidiabetic	0,525	0,020
Hypolipemic	0,501	0,037

The estimation of pharmacological potential of compounds showed, that 1-O-(2-chloro-3-phenyl thio propyl)- $\beta$ -D-galactopyranose (**4**) has a wider range of biological activity than 2,3,4,6-tetra-o-acetyl-1-O-(2-chloro-3-phenyl thio propyl)- $\beta$ -D-galactopyranose (**3**).

A comparison of the PASS predictions data showed, that similar biological activities: *Cholesterol antagonist*, *Sugar-phosphatase inhibitor*, *Mycotoxin-S-conjugate amidase inhibitor*, *Beta glucuronidase inhibitor*, compound (**4**) has with higher Pa value than substance (**3**) and biological activity: *Antifungal*, *Prostate cancer treatment* is relatively low Pa.

Based on a generalization of a vast literary material, biologically active compounds are characterized by a certain specificity of composition and structure. Structural modification of compounds by introducing various molecules or atomic groups in a molecule can determine the effect of molecular separation of fragments on bioactivity.

In our case, the biological activity in compound **4** determines the acetylated groups, which may be the result of spatial exposure. Additional information about the biological spectrum will be further confirmed. Using the PASS Onlainis computer program, the toxic effects of the synthesized substances were determined (**3,4**).

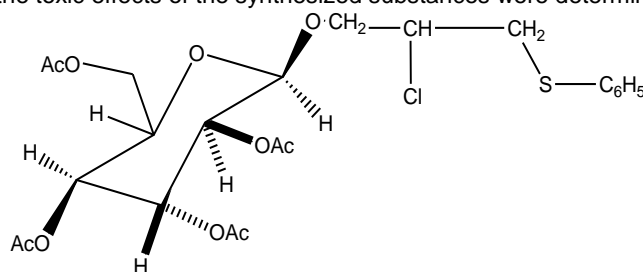


Table 3.

Possible adverse & toxic effects for compound **3** (prediction is based on clinical manifestations, which are sometimes observed in a few or even in a single patient)

Pa>Pi; Pa>0,6

Possible adverse & toxic effects	Pa	Pi
Weakness	0,892	0,008
Diarrhea	0,889	0,012
Muscle weakness	0,859	0,009
Neurotoxic	0,840	0,013
Toxic	0,837	0,021
Drowsiness	0,815	0,019



Sleep disturbance	0,747	0,032
Conjunctivitis	0,725	0,032
Hematotoxic	0,710	0,040
Toxic, gastrointestinal	0,703	0,044

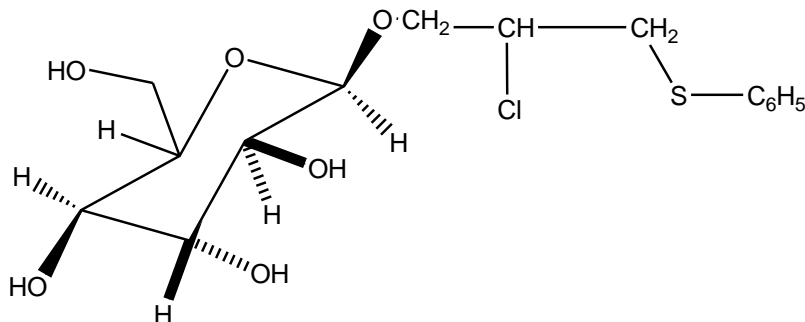


Table 4.

Possible adverse & toxic effects for compound 4 (prediction is based on clinical manifestations, which are sometimes observed in a few or even in a single patient)

Pa>Pi; Pa>0,6

Possible adverse & toxic effects	Pa	Pi
Diarrhea	0,907	0,010
Neurotoxic	0,885	0,007
Dyspnea	0,860	0,009
Toxic, gastrointestinal	0,817	0,023
Fatty liver	0,797	0,004
Drowsiness	0,809	0,020
Hematotoxic	0,803	0,026
Behavioral disturbance	0,791	0,025
Toxic	0,791	0,029
Weakness	0,782	0,021
Sleep disturbance	0,777	0,027
Hyperglycemic	0,743	0,019
Coma	0,733	0,016
Anemia	0,724	0,023
Nausea	0,731	0,035
Embryotoxic	0,708	0,021

The results show that 1-O-(2-chloro-3-phenylthio propyl)-β-D-galactopyranose (**4**) has a wider range of Toxic effect than 2,3,4,6-tetra-o-acetyl-1-O-(2-chloro-3-phenylthio propyl)-β-D-galactopyranose (**3**). Comparison of obtained data similar Toxic effect of substance (**4**) and substance (**3**): Diarrhea, Neurotoxic, Toxic gastrointestinal, Drowsiness, Hematotoxic, Toxic, Weakness, Sleep disturbance. At the same time, substance **4** was diagnosed with Diarrhea, Neurotoxic, Toxic gastrointestinal, Hematotoxic, Toxic, Weakness, Sleep disturbance, the higher Pa values of toxic effects than substance **3**. While the toxic effect of drowsiness is relatively low Pa.

## CONCLUSION

From a theoretical and practical point of view, it is especially interesting to establish some correlation between structure and biological activity, which serves to search for the biological properties of new compounds with preliminary predictions. Identify the biologically active groups in the substance, determine which fragment is the biological activity of the compound. Our goal is to serve this goal.

By assessment of structure-activity relationships biological activity spectrum of synthesized glycosides have been revealed. The results of the study will enable us providing selection of the most prospective compounds from the set of synthesized samples.

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## MATHEMATICAL MODELS FOR COMPUTERIZED CONTROL SYSTEM.

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### ABSTRACT

The software is a set of mathematical methods, and algorithms of information processing, which used in creating the control system. When designing control systems, Initial data for the design of control system.

The tasks of the computerized control system are understood as a part of the computerized functions of the computerized control system characterized by the outcomes and outputs in specific form. control function is: commutative action for computerized control system, aimed to achieve a criterion goal. Depending on the properties of the process and their mathematical description can be combined into different classes; This paper shows the designing the mathematical models which need to computerized control systems (models (3) – (8)). In the same time this paper shows the main methods which were used to formulate the mathematical models as:

- Stochastic and deterministic;
- One dimensional and multidimensional;
- Linear and nonlinear;
- Static and dynamic;
- Stationary and non – stationary;
- With distributed and lumped parameters.

### ABSTRACT

**OBJECTIVE:** Design a new model for computerized control systems.

**METHODS:** Stochastic and deterministic; one dimensional and multidimensional; linear and linear; static and dynamic; stationary and non- stationary; distributed and lumped parameters.

**RESULTS:** This paper shows the designing the mathematical models which need to computerized control systems, by using many methods.

**CONCLUSION:** The software is a set of mathematical methods, and algorithms of information processing, which used in creating the control system. When designing control systems, Initial data for the design of control system. The tasks of the computerized control system are understood as a part of the computerized functions of the computerized control system characterized by the outcomes and outputs in specific form. control function is: commutative action for computerized control system, aimed to achieve a criterion goal. This paper shows the designing the mathematical models which need to computerized control systems.

**Keywords:** control system, Algorithm, Information processing, Criteria, Mathematical model, Characters.

### INTRODUCTION

The software is a set of mathematical methods, and algorithms of information processing, which used in creating the management system. When designing management systems (CS) , Initial data for the design of CS software system is a list of functional task includes the task and function of computer aid design (CAD), computerized enterprise management system and etc.

In this way, part of software of CS including mathematical methods, and means allows us to solve all given tasks a special place in the composition of mathematical support is occupied by mathematical models of continuous technological process, used to manage them. From the mathematical point of view, every continuous technological process can be represented as a control objects.

### FORMULATION OF THE PROBLEM

The tasks of the computerized management system are understood as a part of the computerized functions of the computerized management system characterized by the outcomes and outputs in specific form. Control function is: commutative action for computerized management system, aimed to achieve a criterion goal.

Each task in computerized management system (figure 1) can be formulated at meaningful level but to solve it with the help of computational tools required mathematical description of the problem, i.e, formal presentation of its task Z may be defined as a set of raw data I and decision R:

$$Z \rightarrow \langle I, R \rangle \quad (1)$$

Solution can be obtained by using method, which implemented in the form of the computation chart (algorithm A) or set of algorithms. Solution R can be obtained by the form:

$$R = M [I] \text{ or } R = A[I], \quad (2)$$

Thus, formulation of the problem in computerized management system involves determining I, R, and selection of justification M. Description of the problem statement in computerized management system performed with accordance [1,2,3,4].

In the content of each task is: the purpose of the task, economic and mathematical model of the problem and method its solution, functional interconnectivity problems with information base of computerized management system and enterprise services, how to implement task for computer, reliable solution approximate of the efficiency objectives (expected performance, the cost of machine resources, cost of labor time and material resources for its development). Content of the problem is included in documents (description of the problem statement) and description of the algorithms, who are working a document and design systems (Designers and programmers) and for employees of the enterprise management services.

Each document developed at the stage of technical design of MS and if necessary may be combined in one.

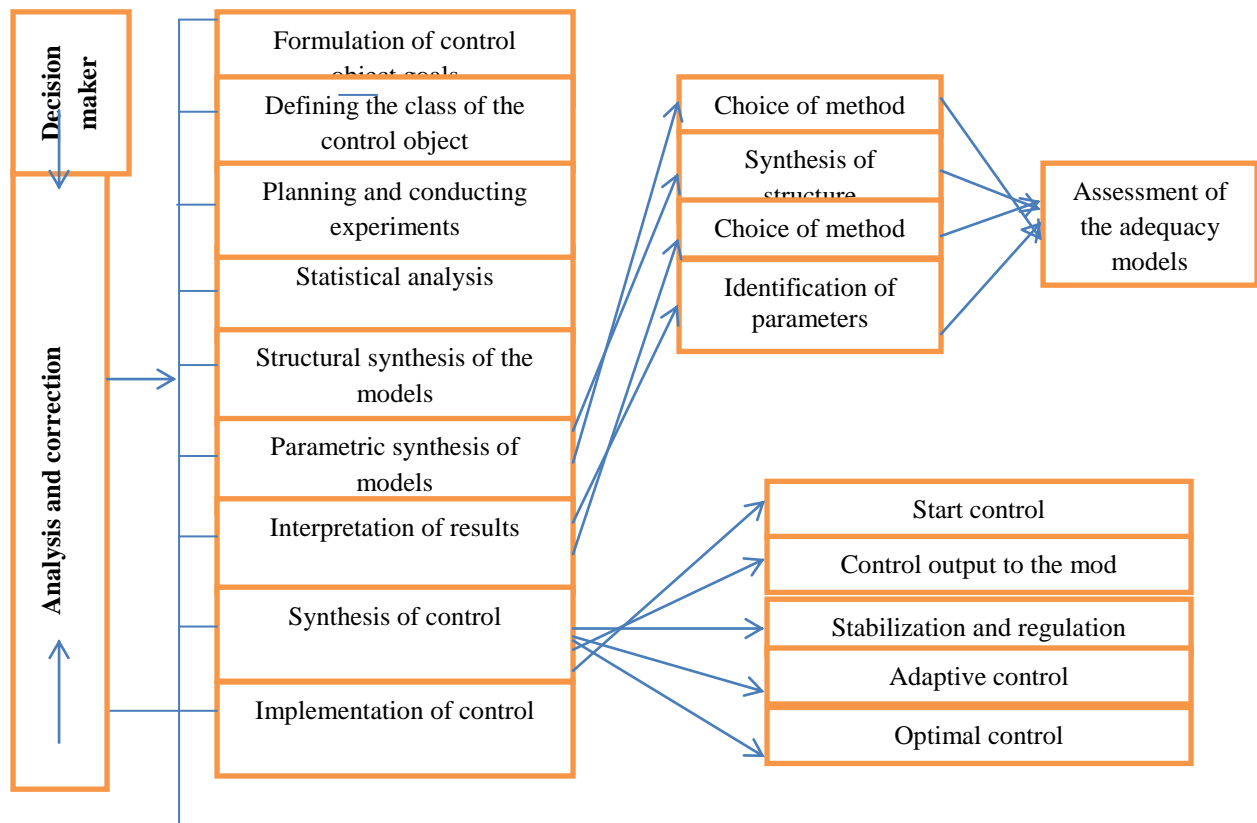


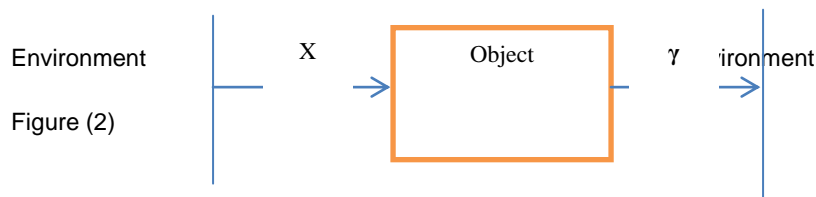
Figure (1) – levels of technological management object.

Realized of software and algorithmic support in MS is a software. A general description is made on the technical design stage and takes the form of a document (description of the software) of ICMS. Fully developed software is described in the detailed design stage and shall be in accordance with the requirements of the program document. The main section of the document (description of the problem statement):

1. Characterization of complex tasks;
2. Output information;
3. Input information

In CMS, engineering process is the main problem of mathematical models of technological process, are used to management the next tasks. Statement of the problem object management can be formulated follows:

Object is described input X; i.e. state of the environment, and output  $y$ , i.e. state of the object



State of the object  $Y$  depends on the environment  $X$ ;

$Y = f^0(X)$ ; where  $f^0$  – characterizes the relationship between input and output object.

Source management purposes the system designer, which forms the purpose in accordance with their needs. If the state  $Y$  not satisfied with the developer recently formative influence on the object, i.e. implements management. If  $Z^m$  indicated the desired goal, then verify the objective  $Z^m$  the object can only be for the conditions  $Y$ . For this state  $Y$  object should be expressed in the form  $Z = \psi(Y)$ . If  $Z = Z^m$ , you must create a management system, which is implemented to purpose  $Z^m$ .

For the implementation of management necessary to find the factors, they may be input object. If we denote management  $V$ , then state of an object depends on the  $X$  and  $V$ :  $Y = f^0(X, V)$ . To formalize the description of their content management problem statement must identify input information  $I = \langle X, Y \rangle$  and the desired result  $V: Z = Z^m$ . The next step after the formulation of the problem is the formulation of mathematical models [5, 6, 7].

### PROBLEM SOLUTION

Depending on the properties of the process and their mathematical description can be combined into different classes; next, we will talk about referring an object to a particular class according to certain feature.

The following classes of process stand out:

- Stochastic and deterministic;
- One dimensional and multidimensional;
- Linear and nonlinear;
- Static and dynamic;
- Stationary and non – stationary;
- With distributed and lumped parameters.

Model of technical process presented in general form:  $Y = F(x)$ ; characterized by a structure  $s_t$  and parameters  $C$ ; i.e. operator  $F = \langle s_t, C \rangle$ . Let's consider the basic models taking into account that, in each class the defining one is one of the properties;

Multidimensionality, linearity, stochastic, dynamism, stationary, distribution.

The multidimensionality of an object is determined by the number of parameters, requiring control and regulation the larger this number is the more complex the subject. Some objects (power units and systems) are sometimes described in several tens and hundreds of parameters.

If, addition the decomposition into the system of linearly independent functions or higher – order differential equation, this dramatically increase the dimension of the problem. It is extremely difficult to obtain a complete mathematical description of such objects.

A linear is called an object, the reaction of with is sum of 2 impacts  $x_1(t)$  and  $x_2(t)$  equal to the amount of reaction to these impacts:

$$F[x_1(t) + x_2(t)] = F[x_1(t)] + F[x_2(t)] \quad (3)$$

The model of such an object is generally described by a relationship

$Y = \sum_{i=1}^n C_i x_i + \sum_{j=1}^m C_{n+j} V_j$ , where  $x_i$  – and  $V_j$  – accordingly the guided controlled input of the object.

Stochastic associated with presence of objects and among various uncontrolled factors, the combined effect of which can simulate a statistical one. The structure of the models of such an announcement

$$Y = F(x, V, E, (t)) \quad (4)$$

Where  $E(t)$  – random process, modulating the existing uncertainty of the object and environment. This uncertainty can be due either to a rapid change in the state of the object, or interference, folding to measure the input and output of the object. Mathematical assuming that all deviations from regulation on the behavior of the object forms random interference  $E(t)$ , the mode takes the form

$$Y = F(X, V) + E(t) \quad (5)$$

Dynamic is present in those cases, when the mathematical description of the process is insufficient representation in the form of a function, it is necessary to use different and integral calculi.

An example of statically model is the decomposition of the output of an object  $Y$  by a system of linearly independent functions  $\{\varphi\}$  inputs  $X, V$ :

$$Y = \sum_{i=1}^K C_i \varphi_i(X, V), \quad (6)$$

Where  $C_i$  – model parameters.



An example to a dynamic structure is a model in the form of linear differential equation  $\frac{d^p y}{dt^p} + a_{p-1} \frac{d^{p-1} y}{dt^{p-1}} + \dots + a_1 \frac{dy}{dt} + a_0 y = B_2 \frac{dt}{dt^2} + \dots + B_1 X$  or of course the difference equation  $y_z = \sum_{i=1}^p d_i y_{z-1} + \sum_{j=1}^L L_j X_{z-j}$ ; where  $a_i, B_j, d_i, L_j$  – model parameters;  $z$  – moment of time.

The nonstationary of object is associated with a deterministic or random change in the time of operator  $F$ . If this change occurs slowly enough, in type Driff parameters, it can be ignored, since the model correction (adaptations) process at each step of control allows adjust a model and thereby compensate of Driff. With a rapid change in character  $F$  nonstationary must be taken into account in the structure of the model and types of dependence  $F$  and  $C$  from time  $t$

$$Y = F_t(X, V, C(t)) = F(X, V, C, t) \quad (7)$$

Where the parameters can depending  $C = C_0 + C_i(t)$ ;

The reason for nonstationary of the object may be its again.

The distribution of parameters usually places in objects, extent territorial, in this case the parameter of the object is a function of the other parameters most often a long object  $L$ , i.e. the model takes the form

$$Y = F_L(X, V, C) = F(X, V, C, L) \quad (8)$$

Models of the form (3) – (8) in addition to defining the structure it is necessary to estimate the parameters  $C$ , mathematical operator used to evaluate  $C$ , is the theory of optimal estimation.

Mathematical methods of model synthesis (3) – (8) they are called identification methods.

## CONCLUSION

The tasks of the computerized control system are understood as a part of the computerized functions of the computerized control system characterized by the outcomes and outputs in specific form. Control function is: commutative action for computerized control system, aimed to achieve a criterion goal. Depending on the properties of the process and their mathematical description can be combined into different classes; This paper shows the designing the mathematical models which need to computerized control systems( models (3) – (8)). In the same time this paper shows the main methods which were used to formulate the mathematical models as:

- Stochastic and deterministic;
- One dimensional and multidimensional;
- Linear and nonlinear;
- Static and dynamic;
- Stationary and non – stationary;
- With distributed and lumped parameters.

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## THE DYNAMICS OF THE FORMATION OF PROFESSIONAL AND ETHICAL COMPETENCE OF SOCIAL PEDAGOGES UNDER CONDITIONS OF TRAINING IN THE MASTER AT THE CONTROL STAGE OF THE EXPERIMENTAL RESEARCH

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### ABSTRACT

This article examines the dynamics of the formation of special competences (moral and axiological, moral and regulatory, moral and reflexive), as the results of the formation of professional and ethical competence of a social teacher at the control stage of an experimental study. Using the methods of mathematical statistics, the general level of professional ethical competence formation after the implementation of the events of the formative stage of the experiment was determined.

**Keywords:** special competences, professional and ethical competence, dynamics, control stage of experimental research, social teacher, magistracy.

### INTRODUCTION

**In the modern educational space of the Russian Federation, which is in the stage of active modernization, the fundamental guidelines are the training of new-level professionals - highly competent, competitive, responsible, capable of prompt decision-making, motivated for the overall result and effective resolution of professional tasks, as well as striving for continuous self-improvement and professional growth. This orientation vector is currently being actively implemented in the context of the priority in the practice of higher education competence-based approach, including in the training of future social teachers in the conditions of the magistracy. One of the important directions in this aspect is the formation of professional and ethical competence of social teachers, the result of the formation of which are special competences (moral and axiological, moral and regulatory, moral and reflexive).**

The issues of professional training of future social teachers in the context of the competence-based approach, as well as certain aspects of the formation of professional ethical competence are studied in the works of N. I. Agronina, O. V. Barkunova, O. N. Grinvald, V. S. Ivanova, A. V. Molchanova, T. V. Nikitina, A. Yu. Prokopenko, E. L. Umnikova, I. Y. Sharova.

### RESULTS

In order to test the effectiveness of the social pedagogical competence formation model of the social pedagogue in the conditions of training in the magistracy, a pilot stage of the experimental research was organized, during which the dynamics of levels and indicators of the formation of all special competences (moral and axiological, moral and regulatory, moral and reflective) were tracked constituents of the structure of professional ethical competence. Empirical data in the control and experimental groups were compared with each other [2, 3, 4].

The ascertaining stage of experimental work (2017-2018) showed a number of problems in the organization of professional training for social teachers, which does not take into account either the theoretical or practical aspects of the targeted formation of their professional and ethical competence.

The formative stage of the pedagogical experiment was conducted during 2018–2019, in which 192 graduate students took part in the direction Psychology and Pedagogical Education 44.04.02.

To obtain reliable results of the formative stage of the experiment, the initial level of formation of the special competences of social teachers was recorded, observation of the dynamics of their formation in the control and experimental groups was organized, and the obtained empirical data were compared.

The dynamics in the levels of formation of each of the special competencies was calculated by the method of A.D. Nasledova [5], which was used at the ascertaining stage of the experiment. General results are shown in table 1. let's analyze them.

Table 1

## Levels of formation of professional and ethical competence of social pedagogues

Competency level	Experimental Group (96)				Control group (96)			
	Ascertaining stage		Control stage		Ascertaining stage		Control stage	
	abs	(%)	abs	(%)	abs.	(%)	abs	(%)
Elevated	0,0	0,0	10	10,4	0	0,0	2	2,1
Advanced	25	26,1	40	41,6	26	27,1	26	27,1
Base	33	34,3	24	25	33	34,4	37	38,5
Threshold	38	39,6	22	23	37	38,5	31	32,3

A qualitative analysis of indicators, which is based on a comparison of the results of diagnostic indicators of students in the experimental and control groups, as well as mathematical calculations, makes it possible to conclude that the increased level of professional and ethical competence of social teachers in the experimental group is higher than in the control group. An elevated level was diagnosed in 9.4% of the respondents in the experimental group. The advanced level of competence in the experimental group was 40.6%, which is 12% higher than in the control group. The base level was recorded in 27% of students in the experimental group and 38.4% in the control group. The threshold level is respectively 24% and 31.1% (a difference of 7.1%).

For the purpose of verifying the effectiveness of the technology and processing the experimental data, the “chi-square criterion” 2 was applied. The calculation of statistics values was performed using the above formula.

In the course of its use, it was concluded that there are significant differences in the level of development of the reflexive competence of students from the experimental and control groups after the experimental training conducted:  $\chi^2_{Emp} = 9.186$ .  $\chi^2_{Emp}$  is equal to or exceeds the critical value, the differences between the distributions are statistically significant (hypothesis H1) [1].

The dynamics of the level of formation of the professional and ethical competence of social pedagogues is clearly presented in Fig. one.

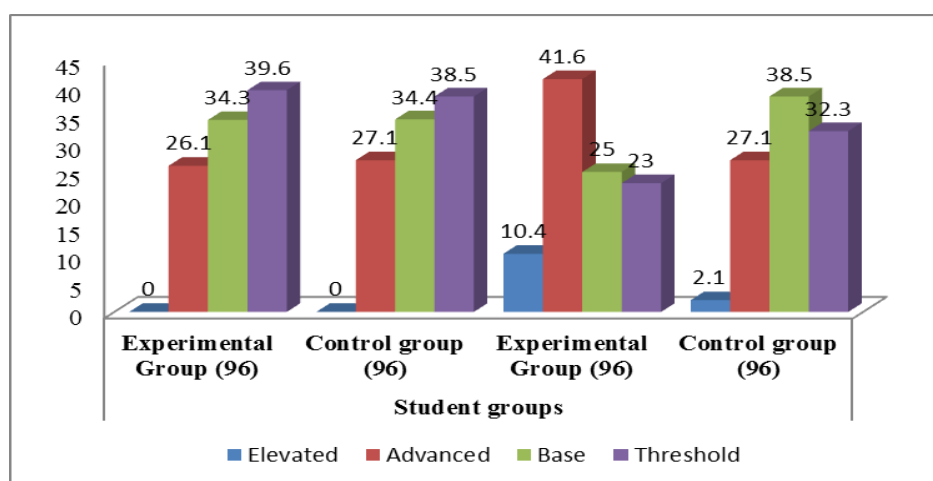


Figure 1. Dynamics of the levels of formation of professional and ethical competence of social pedagogues

## CONCLUSION

Thus, the qualitative changes in the indicators of the levels of professional and ethical competence of students of the experimental group confirm the effectiveness of the implementation of pedagogical conditions aimed at the formation of professional and ethical competence of social teachers in the conditions of the magistracy.

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## CHARACTERISTICS OF EXOPOLYSACCHARIDE *LACTOBACILLUS CASEI* CO<sub>1</sub> AND ITS ANTIOXIDANT ACTIVITY

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### РЕЗЮМЕ

В работе приведены результаты исследований по изучению способности синтезировать экзополисахариды (ЭПС) местным штаммом *Lactobacillus casei* CO<sub>1</sub>, выделенного из эпифитной микрофлоры цветов сирени. В ИК-спектре ЭПС обнаружены интенсивные полосы поглощения в целом характерные для класса углеводов. Установлен моносахаридный состав и определена молекулярная масса экзополисахарида. Выявлена %АРА ЭПС в системе ДФПГ (дифенилпикрилгидразин).

**Ключевые слова:** лактобактерии, экзополисахарид, моносахаридный состав, антиоксидант.

### ABSTRACT

In this work presents the results of studies on the ability to synthesize exopolysaccharides (EPS) by a local strain of *Lactobacillus casei* CO<sub>1</sub>, isolated from the epiphytic microflora of lilac flowers. In the IR spectrum of EPS, intense absorption bands were found, generally characteristic of the carbohydrate class. The monosaccharide composition was established and the molecular weight of the exopolysaccharide was determined. Revealed % RSA of EPS in the system of DPPH (diphenylpicrylhydrazil).

**Keywords:** lactobacilli, exopolysaccharide, monosaccharide composition, antioxidant.

### INTRODUCTION

Among lactic acid bacteria, special attention is paid to bacteria of the genus *Lactobacillus*, whose representatives are widely distributed in nature. Various researchers have shown that lactobacilli have great potential for the synthesis of exopolysaccharides [1].

Some LAB (lactic acid bacteria) form polysaccharides, which are released from the cell as components of the cell wall (peptidoglycans). The latter are either firmly attached to the surface of the microbial cell in the form of a capsule (capsular polysaccharide, CPS) or released into the environment as exopolysaccharides (EPS) [2].

Cultures *L.casei*, *L.lactis*, *L.sakei*, *L.rhamnosus*, *St.thermophilus* refer to heteropolysaccharide-forming bacteria [3]. The structure of heteropolysaccharides can contain several copies of oligosaccharides, which contain from three to eight residues. Two or more different monosaccharides are usually present in each repeating unit and show different types of bonds. It was found that EPS from LAB have significant antioxidant and antitumor activity, and recently they have attracted much attention. L. Zhang et al. [4] found that EPS from *Lactobacillus plantarum* C88 is effective in removing reactive oxygen species (ROS) *in vitro*. EPS from *L.acidophilus* 606 can inhibit the proliferation of HT-29 colon cancer cells, directly affecting cell morphology [5].

The aim of the work is to identify the synthesis of exopolysaccharide by *Lactobacillus casei* CO<sub>1</sub> culture, to study the physicochemical properties and antioxidant activity of the polysaccharide obtained.

### Materials and methods.

The *Lactobacillus casei* CO<sub>1</sub> culture was isolated from the epiphytic microflora of lilac flowers, identified by the classical method and deposited in the collection of the Institute of Microbiology of the Academy of Sciences of the Republic of Uzbekistan.



The isolation of the polysaccharide from the culture fluid *L. casei* CO<sub>1</sub> was performed according to the method described in Cerning, J. et al. [6]. The culture of *L. casei* CO<sub>1</sub> was recovered from the lyophilized state by 2-3 subcultures in MRS-broth and incubation at 37 ° C for 48 hours. The inoculum in a volume of 20 ml (2%, w/v) was added to the MRS-broth medium and incubated at 37°C for 48 hours under aerobic conditions. After incubation, cultures were added with TCA to a final concentration of 4% (w/v) and stirred for 30 minutes at room temperature. Cells and precipitated proteins were removed by centrifugation at 7,000xg for 30 minutes at 4°C. Equal volume of the cooled ethanol was added to the supernatant and kept at 4°C for 48 hours. The precipitated EPS was collected by centrifugation at 7,000 x g for 30 minutes at 4°C. The precipitate was dissolved in distilled water and dialyzed at 4 ° C for 48 hours and then dried by lyophilization. The total amount of carbohydrates in the lyophilized exopolysaccharides of lactobacilli was determined by the phenol-sulphuric method [7]. Quantitative determination of proteins in the composition of the raw exopolysaccharide was carried out by the method described by Yermakov A.I. and others [8].

**Infrared spectroscopic (IR) analysis of the crude exopolysaccharide.** The IR spectra of exopolysaccharide of *L. casei* CO<sub>1</sub> were recorded on a Fourier transform by a Vector-22 IR spectrophotometer (Bruker, Germany) in the frequency range 400–4000 cm<sup>-1</sup>. Two mg of exopolysaccharide was mixed with 200 mg of potassium bromide (KBr) (1: 100 ratio), then the mixture was pressed into a form with a diameter of 16 mm and IR spectroscopy was performed to detect functional groups characteristic of polysaccharides [9].

**Analysis of monosaccharide composition of exopolysaccharide from *L. casei* CO<sub>1</sub>.** The installation of the monosaccharide composition obtained by EPS using gas chromatography [10].

To establish the monosaccharide composition, the polysaccharide was hydrolyzed with 1N concentrated sulphuric acid at a temperature of 100°C for 6 hours. Then the hydrolyzate was neutralized with barium carbonate, deionized with KJ-2(H<sup>+</sup>) and evaporated o 1 ml on a rotary evaporator. The identification and quantitative composition of the monosaccharides was determined on a GC Plus2010 gas chromatograph (Shimadzu, Japan) under the following conditions: temperature of injector 250°C, total flow 60 ml/min, flow through the column 0,89 ml/min, carrier gas - nitrogen, column - Rxi-624SI MS, column length – 3 m, inner diameter ID – 0,25 mm, the column temperature is 230°C, the temperature of the detector is 250°C, the form of derivatives is acetates of aldonitriles.

Molecular mass characteristics were determined on an Agilent 1260 Infinity SEC chromatograph (Agilent Technologies, USA).

**Antioxidant activity.** Antioxidant activity was judged by the binding of 1,1-diphenyl-2-picryl-hydrazilic oxide radicals (DPPH) [11]. To 1 ml of an aqueous solution of exopolysaccharide from *L. casei* CO<sub>1</sub> was added 2.0 ml of an alcohol solution of DPPH (0.4 mM). The mixture was thoroughly mixed and incubated at room temperature in a dark place for 30 minutes. The absorption coefficient of the mixture was measured at 517 nm on a Cary 60 UV-Vis spectrophotometer (Agilent Technologies, USA). Radical scavenging activity was calculated by the formula: DPPH radicals scavenging activity (%) =  $\frac{(A_0 - A_1)}{A_0} \times 100$ , where - A<sub>1</sub> - the absorption coefficient of the solution with a certain sample content; A<sub>0</sub> is the absorption coefficient of the DPPH solution without a sample. An aqueous solution of ascorbic acid was used as a control.

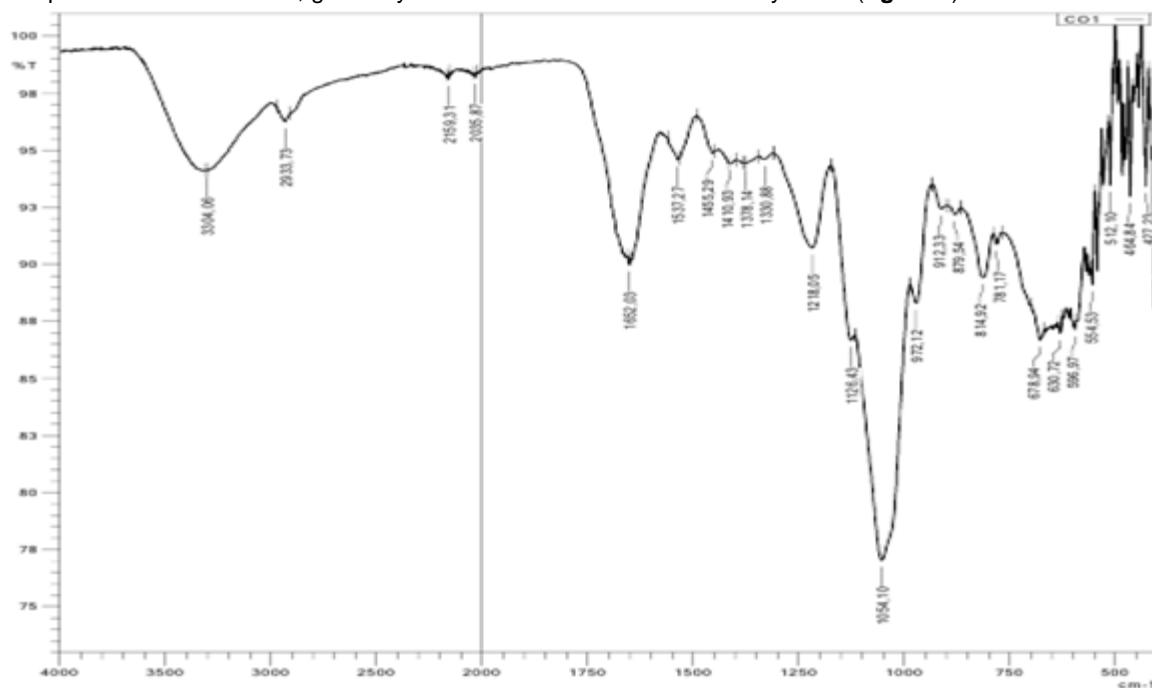
## Results and discussion

**Isolation of the polysaccharide from the culture fluid *L. casei* CO<sub>1</sub>.** The output of freeze-dried crude EPS *L. casei* CO<sub>1</sub> was 400 mg/L. The lyophilized EPS of creamy beige color, well dissolved in water, had a smooth fibrous structure. Crude EPS contained 7.11% protein (nitrogen content 1.13%).

Exopolysaccharide biosynthesis is a complex process involving a large number of enzymes and regulatory proteins. In mesophilic LAB strains, like *Lactococcus*, the genes encoding proteins involved in the synthesis of EPS are located in plasmids, and in thermophilic streptococci and lactobacilli in chromosomes [12]. Typically, the yield of heteropolysaccharides is from 0.05 to 0.60 g/l [13], on the contrary, homopolysaccharides are synthesized in large quantities to almost a few grams/liter [14].

MRS broth is the most suitable medium for the growth and synthesis of LAB biopolymers. But for industrial purposes and from an economic point of view, the use of waste from other industries as a basis for the nutrient medium is appropriate [15]. There are many discussions about the formation of EPS under the influence of various conditions. It is generally recognized that the cultivation conditions or several other factors (pH, temperature, incubation time and composition of the growing medium) have a significant impact on the yield and EPS composition. The results of studies by some authors show that the lactobacilli strain, depending on the carbon source of the nutrient medium, can produce EPS with different rheological properties [16]. B. Adebayo-Tayo et al (2008) notes that serum is the best medium for EPS production in which *L. casei* LCN1 synthesized 198.69 mg/l of polymer [17].

**Infrared spectroscopic (IR) analysis of the crude exopolysaccharide *L. casei* CO<sub>1</sub>.** In the IR spectrum of EPS, intense absorption bands were found, generally characteristic of a class of carbohydrates (figure 1).



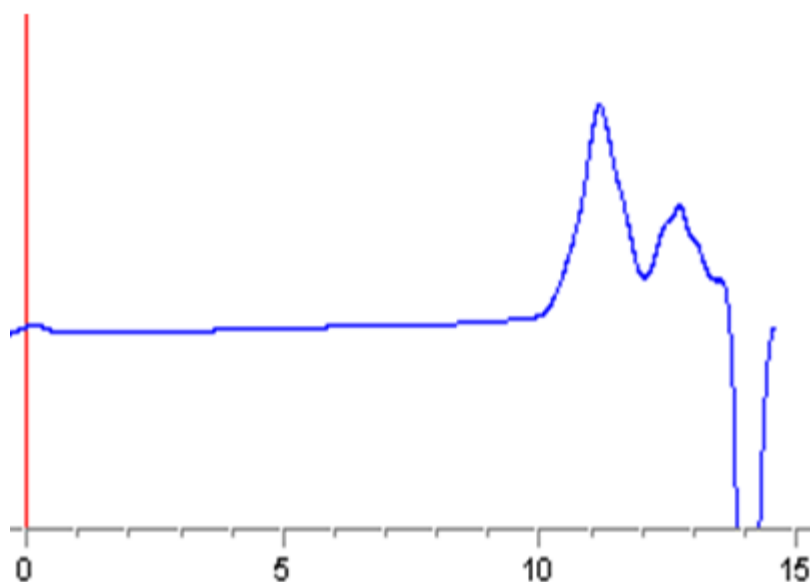
**Figure 1.** IR spectrum of EPS from *L. casei* CO<sub>1</sub>.

The widely located peak at 3304.00 cm<sup>-1</sup> belongs to the hydroxyl group [18]. A weak peak at 2933.73 cm<sup>-1</sup> indicates the presence of aliphatic CH<sub>2</sub>, which are found in proteins and other organic substances. Peak at 1662.03 cm<sup>-1</sup> resembles a mannose or galactose ring. A symmetrically extended absorption peak at 1378.14 cm<sup>-1</sup> is formed from the –COO– group. Peaks in the range of 1218.05-1054.16 cm<sup>-1</sup> indicate C-O and C-O-C glycosidic link vibrations, demonstrating the presence of carbohydrates. The sharp peak at 1054.16 cm<sup>-1</sup> indicates the presence of a polysaccharide [19].

#### **Monosaccharide composition of exopolysaccharide from *L. casei* CO<sub>1</sub>.**

GC analysis of the monosaccharide composition of EPS from *L. casei* CO<sub>1</sub> showed that this EPS consists of mannose, glucose and rhamnose in an approximate ratio of 11.3:1.7:1, respectively. The polysaccharide isolated from *L. casei* CGII grown in a medium containing 20 g/l as a carbon source, consisted of glucose (76%) and rhamnose (21%), and traces of mannose and galactose were also detected [20]. HPLC analysis of the monosaccharide composition of EPS obtained from *Lactobacillus sakei* CY1 showed that glucose and galactose predominate in its composition [21]. Verges et al. reported that the EPS of *Lactobacillus sakei* consists mainly of glucose and rhamnose in a ratio of 3:2 [22]. The purified exopolysaccharide produced by *Lactobacillus plantarum* YW32 had a molecular weight of 1.03×10<sup>5</sup> Da and consisted of mannose, fructose, galactose and glucose in an approximate mass fraction of 8.2:1:4.1:4.2, respectively [23]. The molecular weight of the EPS obtained from *L. casei* CO<sub>1</sub> was 7.1×10<sup>4</sup> Da, the polydispersity index was 1.9 (figure 2).

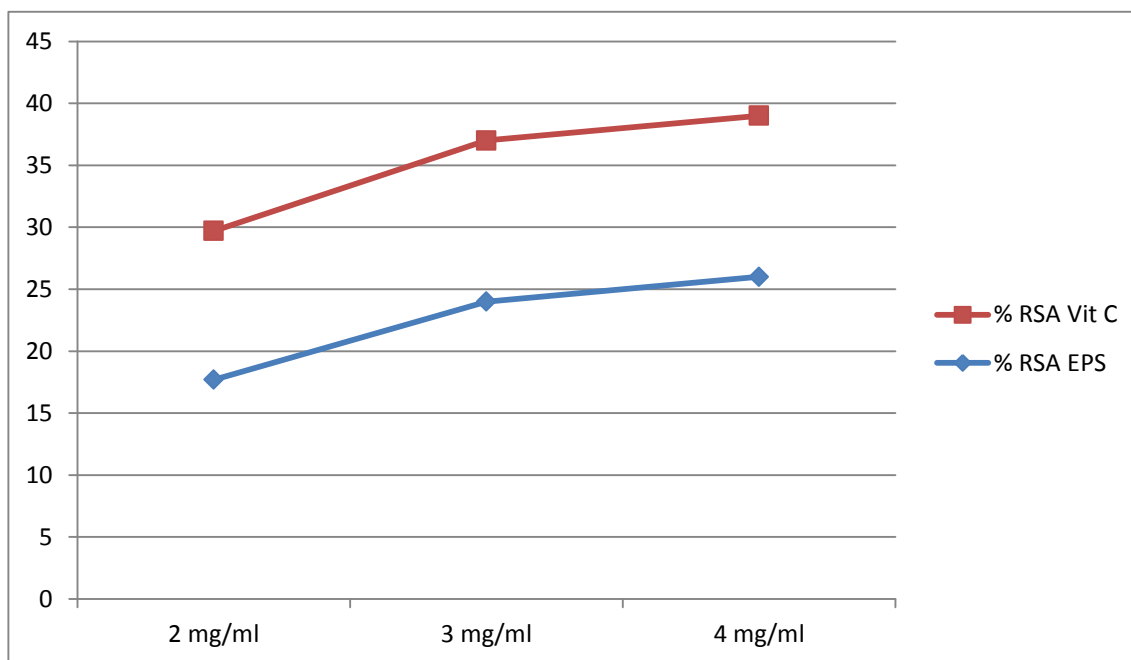
M<sub>w</sub>/M<sub>n</sub>=1,9                      71000              6300



**Figure 2.** Chromatogram of molecular weight of EPS from *L. casei* CO<sub>1</sub>

The molecular weight of EPS obtained from *L. plantarum* YW32 is determined to be  $1.03 \times 10^5$  Da. The polydispersity index was equal to 1.255, which means the presence of a homogeneous material EPS in the sample under study [23]. Many authors argue that the molecular weight is of great importance in the manifestation of the biological activity of EPS. It was shown that high antioxidant activity of EPS from *Bifidobacterium animalis* RH is due to its low molecular weight [24]. EPS with a high molecular weight have antitumor activity than EPS with a low molecular weight [25].

**Antioxidant activity of EPS from *L. casei* CO<sub>1</sub>.** Antioxidant activity may be due to a variety of reactions and mechanisms. In our work, we studied the antioxidant activity of EPS from *L. casei* CO<sub>1</sub> in order to bind the diphenylpicrylhydrazil oxide radicals (DPPH) *in vitro* in comparison with ascorbic acid. As can be seen from figure 3, the radical scavenging activity of EPS from *L. casei* CO<sub>1</sub> increases depending on the concentration of the investigated EPS: % of the radical scavenging activity (RSA) was at a concentration of EPS 2 mg/ml 17.7%; at 3 mg / ml 24% and at 4 mg / ml 26%.



**Figure 3.**Antioxidant activity of EPS and ascorbic acid.

Excessive production of free radicals leads to oxidative damage to biomolecules (lipids, proteins, DNA), resulting in many chronic diseases, such as atherosclerosis, cancer, diabetes, rheumatoid arthritis, post-ischemic perfusion injury, myocardial infarction, cardiovascular diseases, chronic inflammation of organs, stroke and septic shock, aging and other diseases [26]. In Zouaoui Benattouche et al. notes shows that when studying the activity of EPS from *S. thermophilus*, the highest antioxidant activity of 55.83% was observed with the concentration of PES 1000 g/ml [27]. Although the EPS from *L. plantarum* YW32 comparatively low results were obtained than with ascorbic acid, but at a dose of 5 mg/ml, EPS shows promising antioxidant activity with 30% absorption of DPPH radicals [23].

The bioactivity of EPS may depend on many factors, such as chemical composition, molecular weight, structure, configuration, extraction and purification conditions. The molecular weight of EPS plays an important role in antioxidant activity [28].

## CONCLUSIONS

EPS isolated from *L. casei* CO<sub>1</sub> has a molecular weight of  $7.1 \times 10^4$  Da and consists of mannose, glucose and ramnose, in a ratio of 11.3: 1.7: 1, respectively. Also, this EPS has antiradical activity and can be used as an alternative to chemical antioxidants in the food and pharmaceutical industry.

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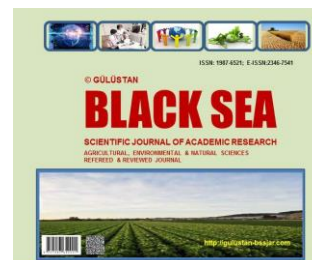
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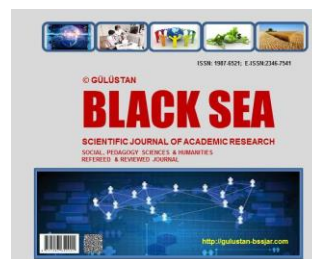
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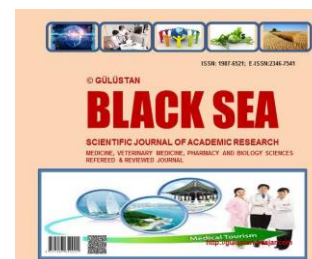
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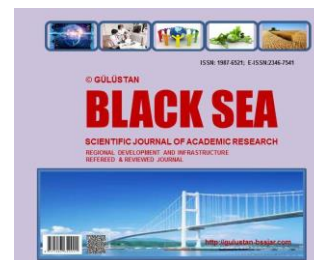


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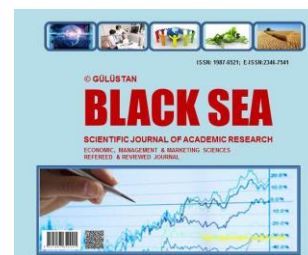
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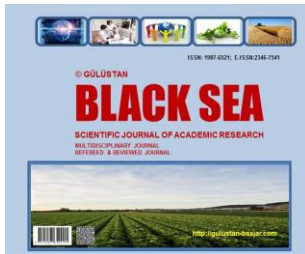




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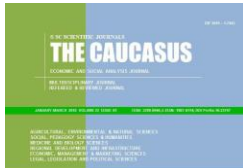


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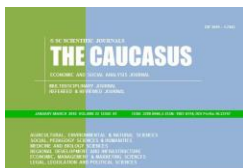


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