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## Section 1. Architecture

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### Symmetrization of an architectonically plan composition of the city

**Abstract:** The process of symmetrization of an architectonically plan composition of the city is described in the article. Taking into account the cyclic recreation of different types of symmetry in historical stratifications of the municipal planning, there were formed a set of principles exposing some mechanisms and forms of symmetrization an architectonically plan composition of the city with different stages and levels of its becoming.

**Keywords:** symmetry, city development, composition plan of the city, symmetrization, principles.

The trend today for fast and in many cases chaotic growth of cities is disturbed the formation of compositional framework very often. Because of this, cities that have the ongoing development and taking on features of territorial-economics and urbanized system at the main stage lost its art quality in many cases. It leads for increase of planning and building disharmony and for ignoring the laws of the word picture of the urban space formation.

The problem of architectural stiffening with city development decision, a similarity planning penetrability, a creation of an urban realm with aesthetically impressive are not running its course over the past ten years. The diversity and dynamics of numerous factors of cities development agitate architects for the new methods planning research that is able to provide possibility of more effective architectural-artistic appearance of modern city formation in the future. In the documents of last year's international organizations including but not limited the Architects International union congress which has taken place in Beijing and Berlin, the necessity of the artistic level increase of the city development decisions is underlined.

The development of methods spatial composition city formation testifies to organic combination its architectonically plan organization with other facilities such as proportions, rhythm, symmetry and so on. An influence of these categories for the quality of the city development decisions that is not inconclusive to the end, it is analysed with a lot of fundamental labours getting covered with problems of general composition theory. The analyses of the special literature and advanced studies have showed that symmetry as the means of harmonization municipal space development in a wide plan is not examined enough. Principles, methods and innovative techniques of symmetry as the facilities of dynamic municipal space composition transformations are not making a study of in a modern town-planning theory and the methods of evolutionary analysis of symmetric municipal planning transformations of are not worked out". It is possible to look after pursuance of the symmetrization and rhythmization of its planning in many historical cities and agglomerations at the different stages of development [1, P. 450]". In this research symmetry is examined as a shape-generating and harmonizing, spatial and plan factor, means and method of forming and dynamic development of an architectonically plan composition of the city.

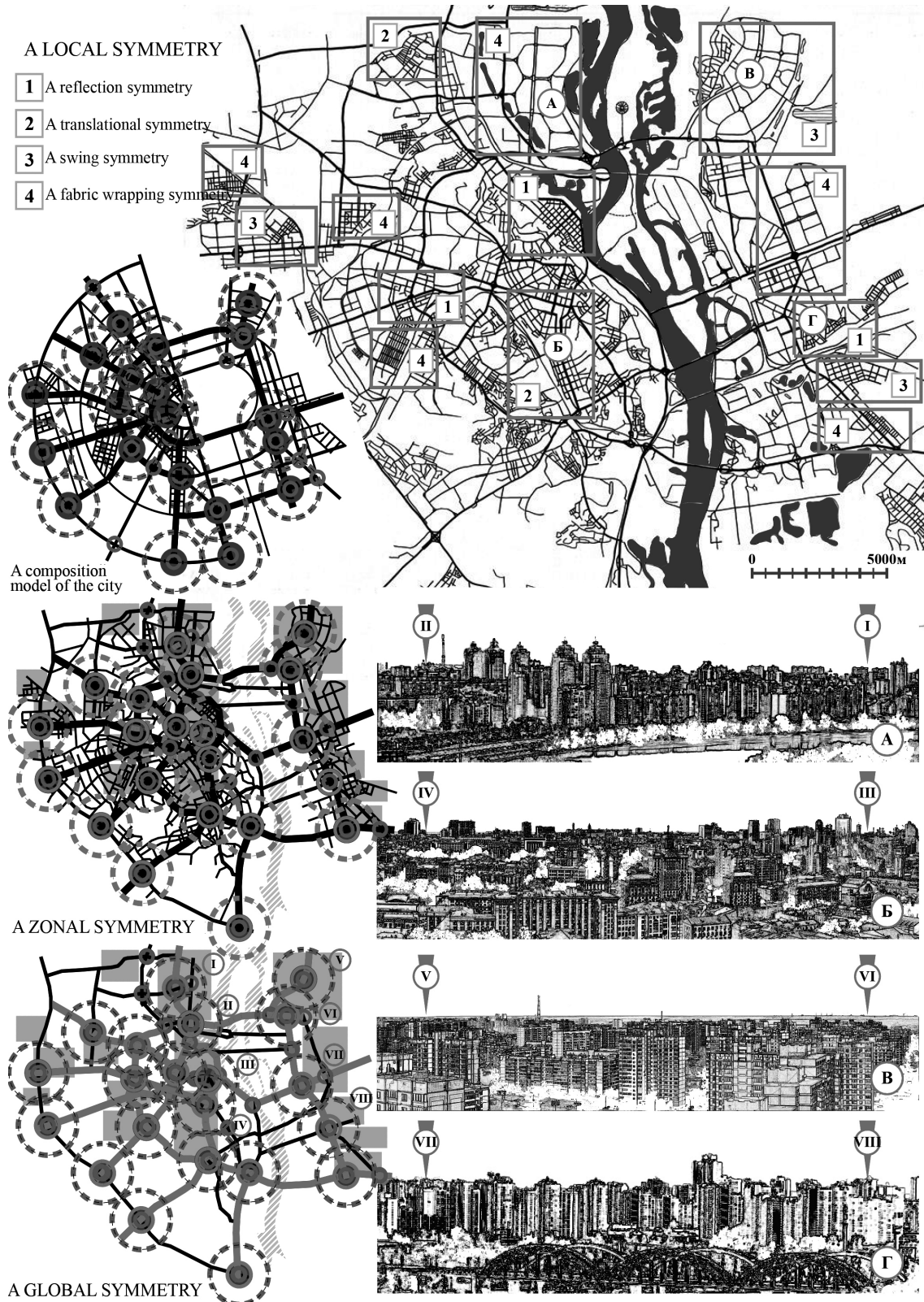
A. E. Guntov differentiated the spatial system of city for three fundamentally excellent groups — «framework», «fabric» and «plasma». «Framework» is firm ground, relatively unchanging subsystem — its soil skeleton. For the city development system the framework is a structure of main highways, IDF room and another city route building. «Plasma» is flexible elements that react for the change of external terms quickly. It is temporal building, site landscaping, elements of poppy-head. «Fabric» is something intermediate between «framework» and «plasma», it is own body of the spatial system like as dwelling-houses and service building [2, P. 97].

Based on this research, it is necessary to mark that symmetric structure development of plan composition in accordance with the evolution of cities and city development idea it comes nearest to the observed facts with global, zonal and local levels, relevant phase formation of the plan framework, polycentric-zoned organization and plan fabric of the city (pic.1). The global level of symmetrization characterizes a general plan composition of the city at the level of the framework composition that is formed with main axes along main streets and existent municipal centers. A zonal level of municipal plans symmetrization is characterized as a polycentric composition structure was created by municipal centers with the affected zones connecting with main and second-rate composition axes along corresponding streets and highways. Elements of the city composition structure make a connection between local centers and streets' network at the local level of symmetrization. Symmetries of different levels are superimposed on one another and co-operate creating individual pictures and configurations of a city plan composition. As a result of changes a various symmetric organization was formed in different periods of development, it leads to dispersed or leak less, concentrating plan compositions, provoking the corresponding changes of the municipal planning. As a result at the each every development stage the elements of the harmoniously organized plan structure are well-organized takes place on the territory creating integral and balanced, and on the whole architectonically city development composition with the signs of symmetric transformations [3].

The analysis of architectonically plan composition development of the largest cities of Ukraine and other countries was conducted with comparison positions of its plans composition pictures summa-

rizing the different levels of symmetrization. These cities include the developed historical center and considerable in size new urbanized territories and it is showed the rapid rates of its development and the presence of further advance opportunity. The choice of these cities

with the different types of a plan composition is conditioned with the necessity of exposure the steady to common factors of natural and project symmetric transformations for certain historical and city-planning terms.



Pic. 1. Analysis of Kyiv city a plan composition

The research of zonal and local cities composition framework was showed the presence of steady tendency to the symmetrization of city-planning composition at the different stages and levels of municipal plan formation. From these positions a local symmetrization coincides with aspiring to organization and harmonization of certain

locus-place by the municipal plan — the primary fragment of city composition structure. The analysis of historical and modern cities planning was showed that in their plan fabric in different places and at the different stages of development gradually or with the different types of symmetry are formed simultaneously. The association of

these kinds into the consistent system is allowed to find out a chart and principles of symmetric transformations at the local level of the city plan fabric. There are principle of reflection, portability principle, swing arc principle, fabric principles and principles of centrality. The principle of smooth essence is consists of an implementation or supporting of ambidexterity characteristic in the naturally existent processes or the conscious harmonization of plan making composition elements for the specific place at the municipal territory. The content of movability principle is found in the plan making composition elements using in the local unity of municipal fabric formation that is induced or has available all characteristic of translational symmetry. The turning principle is found in trying and stimulates the usage of all turn symmetry characteristic in local plan making. The realization of grid pattern principle in the local plan fabric of the city formation is connected with the usage and saving the composition elements with the symmetry reticulated packing characteristic. The principle of centralization is testifies that all central symmetry characteristic forming with natural way or inculcated with a project, it is desirable to use for plan fabric development. The analysis of fragments and architectonically plan composition parts of many cities is showed that its plan-creating exists at local level and tendency for symmetric transformations of different kinds continue to develop. If you use it on principle, it will assist to harmonization for not only primary elements but also more important parts of a city plan composition relating with polycentric structure. The polycentric structure in this research is determined as a network of competitive centers of municipal meaning with its own affected area interrelated with transit communications providing a creation of more or less the balanced design system of centers and axes, areas and streets, district and municipal meaning. It is found out that the composition of municipal plan submits for influence of next symmetrization principles at the zonal level: monocentrism, polycentrism and multicentrism. An influence of monocentric principle is consists of in the city composition structure accenting of the one multifunction center named urban node that is determined the sustained development composition from the different types of symmetries in its affected area. The next stage of symmetrization process is connected with taking into account the phenomenon of municipal plan polycentric. The role of polycentric principle is consists of the symmetrization processes stimulation of a few dominant and equivalent district and municipal centers at the affected area, more or less is situated in the plan composition cities that come to is in the historical development process or mastering of new municipal territories. The multicentric principle is consist of an existence in the polycentric composition structure of the city of many functional centers of higher agglomerative or megapolis level with the own affected zones and submitting its symmetries elements uniting in totality; it is forming a symmetry of higher level. Summarizing the processes of symmetrization by the centric quality characteristic it should be noted that zonal symmetry as a display of natural polycentric of a functional plan organization for large and the largest cities, summarizing fundamental influence of local symmetries, in combination with its assists the origin of new symmetries types at the forming and development level of a general city architectonically-plan composition. If in this research local and zonal levels related with municipal fabric and polycentric-zonal organization, the composition

framework of city, as a structure uniting in itself all constituents of the municipal planning and levels of its symmetrization on the basis of general principles would correspond the global level of symmetrization. The analysis of composition-plan frameworks formation and development was showed that its natural symmetrization is under the sway of priority principles, stratification, coincidence, dynamic quality and fractal. The priority principle is consist of the usage of elementary symmetric transformations in a city plan composition at the global level like as an ambidexterity, a transfer symmetry, a turn symmetry, a reticulated packing, a central and spiral symmetry. The accruals principle is reflected in the processes of imposition of different types symmetries, when as a result of its transformations there is a new level, where the general for all layers symmetric composition planning out elements are kept at the global level of municipal framework's plan making. Activation of compatibility principles are testified that in municipal framework and in the city plan composition the coming to a head necessity of association, contrasting or comparison of the different symmetry systems that due to connecting to stipulate an origin and development of the symmetry system for new global level. The dynamic principle, as a motive reason of natural orientation to the global symmetrization is an understanding of development, after that changes in the state of a plan system and composition basis of the city takes place appropriately, it means with the cyclic order formation. It is possible to consider a town-planning recurrence not only cycles is that related to the territorial height and structural development. These two transformations stages of a plan and composition system, as a rule, are accompanied with the periods of completion and complication of its spatial and symmetric organization. From these positions the general cycle of dynamic development it is suggested to examine as a successive change of periods of gradual transformation from the symmetry into the dissymmetry, from rhythm into eurhythmy of composition construction of a framework city plan. A continuous transition and transformation of the stages of symmetrization and rhythmization of general composition basis according to the transitional stages that are characterized with the aspiring to the intermediate dissymmetrical and eurhythmic, it means symmetrically spliced composition forms. The usage of dynamic principle gives an opportunity to diagnose the existent state and forecast future changes in cyclic and appropriate symmetrically -eurhythmic development of the city composition architectonically-plan. The fractal principle of the usage of that is based on fundamental positions of fractal geometry, basis of that is presented by self-similarity and proportion of different level elements of the global and hierarchical symmetries system that is accompanied with the origins of dissymmetry and rhythm at the local level becomes an important research for the composition-plan symmetrization theory.

It is shown in research that principles of global symmetrization of composition framework as well as local and zonal principles of a plan fabric and polycentric structure formation are able to basis on the simulation model of processes reproduction of natural symmetrization for plan transformations. As researches showed if you use the symmetrization principles and corresponding simulation model at the initial stages of planning it will allow to create terms for harmonic composition of municipal plan formation and natural development at the all stages and levels of its transformations.

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## Section 2. Biology

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### A determination of antioxidant vitamin C during the period of growth of grains and leguminous plants

**Abstract:** Vitamin C is supposed as strong antioxidant, plays major role in the process of oxidation. The aim of the research is to find out preparations such as high antioxidant by using of local productions. There is a difference in the quantity of vitamin C in cultivated grains and leguminous plants that it is supposed to depend on the period of growth. It differentiates at 1-st, 3-rd, 5-th, 7-th and 9-th days.

**Keywords:** Carotinoid, flavonoid, ascorbinatoxidaza, cultivated corn, barley, oats, lentil, soybean.

A biological importance of antioxidants in organisms of animals and plants is so high. Antioxidant compounds inhibit the free radicals and periks oxidation of lipids in organism [3]. Natural oxidants involve phospholipids, tokoferols, vitamins A, K and karotinooids, flavonoids, polyfenols, ascorbic acids and lemon acids [5; 6].

We can use the antioxidants for against of line illnesses for correction [7].

Vitamin C is the strong antioxidant, and it is useful in oxidation-returning reactions and it takes part in collogen synthesis, iron and folat acid exchanging, hormone and catecholamin synthesis and others.

Sweet- brier, black smorodina and walnut are rich with ascorbic acids and we can prepare the extract and concentrates from them and it uses in medicine [8]. There are many sources that vegetables and fruits have ascorbic acids [4].

It was defined that various biological active matters have antioxidant properties in grown grain plants [1; 2].

The main aim of our research is to search the preparation which it is rich with high effective antioxidant properties and it is easy to take them from national products.

The objects of the research: grown wheat, barley, oats, lentil, soya bean. We held our research on wheat, barley, oat, lentil and soya

bean plants, which they are cultivated in 1, 3, and 5, 7 and 9 — days of growth periods. We defined the antioxidant property of vitamin C quantity and activity of ascorbinatoxidize ferment in the grain and leguminous plants. To define of vitamin C quantity is based to property of returning of 2,6-dychlorindofenol in the sour condition of ascorbinat acid. In this condition the dense of blue color of 2,6-dichlorindofenol indicator (oxidized form) changes to returning form by ascorbat acid [9].

We defined the activity of ascorbinatoxidize ferment by spectrophotometer in 265 nm wave length and give attention to the quantity of ascorbic acid [9].

Ascorbic acid has the maximum returning property of the ray (light) in this wave length. Ascorbic acid is oxidized by ascorbinatoxidize influence. The oxidization level of ascorbic acid is a right proportion of ferment activity.

Our results showed that the quantity of vitamin C on the antioxidant property belongs to growth period of grain and leguminous plants and it was differentiated on quantity.

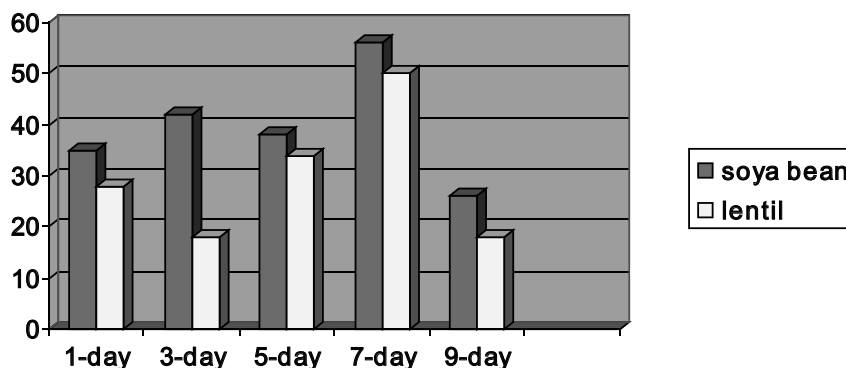
It was defined that the quantity of vitamin C in grown grain plants which in barley is more high than wheat and oats in the 1, 3, 7-grown days (table-1).

Table-1. – A quantity of vitamin C in grown grain plants (mg/%)

Grown days	wheat	barley	oat
1 day period	15,54±0,3	27,28±0,88	18,48±0,88
3 days period	47,52±1,7	39,6±4,4	16,28±0,74
5 days period	25,08±0,42	36,08±5,8	1,98±0,44
7 days period	33,88±0,44	69,81±5,47	36,52±1,32
9 days period	24,2±1,3	18,48±0,88	22±3,52

In growing period of barley the quantity of vitamin C is high that it consists of first day — 27,28 mg/%, third days — 39,6 mg/%, seventh days — 69,8 mg/%.

In leguminous crops that lentil and soya bean's growing period the quantity of vitamin C is high in soya bean than lentil. Its high quantity consisted of 48,4 mg/% on seventh days of growing period (Picture 1).



Picture 1. Quantity of vitamin C in grown plants

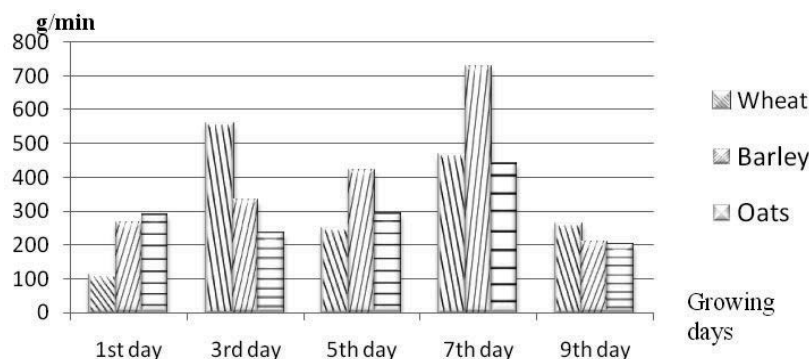
Thus, the most quantity of vitamin C consisted of 47,52 mg/% on the third days of growing period in wheat, on the seventh day of barley — 69,81 mg/%, on the seventh days of oat - 36,52 mg/%, on the seventh days of lentil — 49,2 mg/%, on the 7<sup>th</sup> days of soya bean — 54,4 mg/%. There are ascorbinatoxidaza ferments in all plants. This ferment catalyses the L- ascorbic acid to oxidization of dehydroascorbic form. There is 0,26% copper in ascorbinatoxidaza. At first, activity of ferment was determined in cabbage loaf [4].

In grain and leguminous crops in growing period, we defined the activity of ascorbinatoxidaza [9].

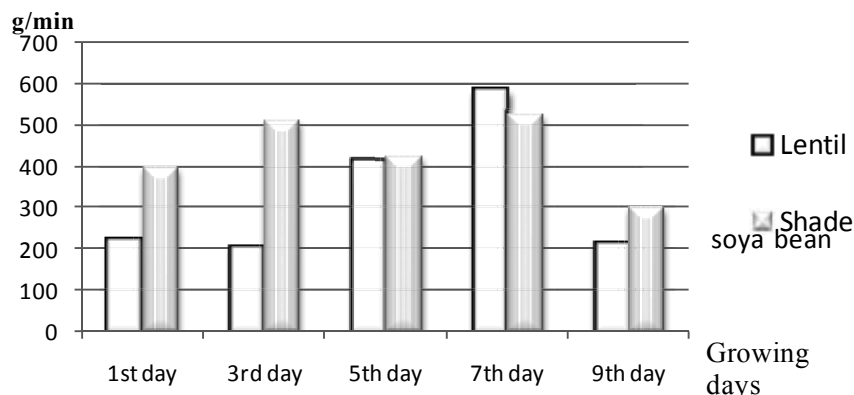
According to the results, ascorbinatoxidasa ferment's activity is changeable in grain and leguminous plants' growing period and it determines that ferment's highest activity depends on grain and leguminous crops' growing period.

It is known that dehydroascorbic acid is biological active, it meet with ascorbic acid in plants' tissue and in certain condition changes to ascorbic acid consequence of ferment's influence [8].

It was defined that ascorbinatoxidaza's activity in the third days of wheat is high than barley, oats in the growing period of grain plants and it organized 557,6 g/min. The highest ferment's activity was defined in barley; it organized about 730,2 g/min in the 7<sup>th</sup> day in the growing period of grain plants. The activity of ferment is an equal to 441,3 g/min in oats (Picture 2).



Picture 2. Ascorbinatoxidaza activity in grown grain plants



Picture 3. Ascorbinatoxidaza activity in grown leguminous plants

It was cleared that the activity of ascorbinatoxidaza is high in soya bean plant in comparison with lentil in the 1st, 3rd, 5th, 7th and 9th growing days of grown leguminous plants. The highest activity of ascorbinatoxidaza was defined in the 7th day of soya bean, it is 583,95 g/min, and in lentil it is equal to 525 g/min (Picture 3).

So, the source of strong antioxidant such as vitamin C is formed in grown grain and leguminous plants, its quantity depends on their growing's periods. The highest quantity of vitamin C was defined in the 3rd day of wheat, barley, oats, lentil of grown periods and it was determined in soya bean's 7th grown days.

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## Comparative analysis of conversion of physicochemical properties of biofilm-forming bacteria resistant to the innate immunity factors

**Abstract:** We conducted a comparative analysis of conversion physicochemical properties of biofilm-forming bacteria that are resistant to the bactericidal activity of blood serum, lysozyme and fraction of low molecular weight platelet peptides. It was established that bacterial resistance to blood serum, lysozyme and low molecular weight platelet peptides correlates with low hydrophilic and high values of electrokinetic potential cells. The conversion of physicochemical properties of bacteria, during incubation with the innate immunity factors, has unidirectional character and contributes to the increase of hydrophilic cells. The shift of physicochemical properties a bacteria increases in the range – E.coli < S.aureus < coagulase-negative staphylococci.

**Keywords:** Escherichia coli, Staphylococcus aureus, coagulase-negative staphylococci, HLB (hydrophilic-lipophilic balance), electrokinetic potential.

### Introduction

Relevance of the study a bacterial resistance to the innate immunity factors is caused by a significant growth of bacterial resistance to antibiotics [10], as well by increase in the number of immunocompromised patients [2]. Therefore, one of the important research directions is deciphering the mechanisms related to the formation of unsusceptible bacterial phenotype (morphotype), which is resistant to the innate immunity factors and antibiotics.

The combined selective effect of antibiotic therapy and innate immunity factors contributes to the selection of unsusceptible bacterial phenotype resistant to antibiotics and innate immune factors, what sometimes leads to bacteraemia and sepsis [7; 8]. The common pattern for clinical isolates of microorganisms, which were extracted from niduses of purulent-inflammatory diseases of soft tissues, is a high degree of hydrophilic of the surface both for bacterial cells [3] and yeast-like fungi of the genus *Malassezia* isolated from the cases of mycoses, accompanied by inflammatory changes to skin [1]. In this context, mechanisms related to the formation of resistance biofilm-forming bacteria to bactericidal activity of blood serum and low molecular weight platelet peptides represent the unquestionable interest [12; 13]. As we have previously shown [3], the main physicochemical indicator, which demonstrates the formation of resistant phenotype of microorganisms, is seen to be conversion (shift) of physicochemical properties of bacteria. Nevertheless, direction and value of conversion physicochemical properties (HLB and electrokinetic potential) of biofilm-forming bacteria resistant to the innate immunity factors remain unknown.

The objective of the study was to conduct a comparative analysis of conversion physicochemical properties of clinical isolates biofilm-forming bacteria resistant to the innate immunity factors.

### Materials and methods

The research was based on biofilm-forming strains of clinical isolates of bacteria extracted from urogenital infections and from the bile of patients with an infectious-inflammatory pathology of the biliary tract (cholangitis, cholecystitis). For the study we selected biofilm-forming strains of bacteria (*E.coli* (n=36), *S.aureus* (n=12)) and coagulase-negative staphylococci (*S.epidermidis*, n=6; *S.hominis*, n=12; *S.haemolyticus*, n=11). Identification of bacteria was carried out on the basis standard methods by morphological, tinctorial, cultural and biochemical properties with the use of standard systems «StaphyTest» and «Enterotest I, II» (LaChema, Czech Republic).

In this study we used the frozen-dried preparation containing the mixture of antimicrobial peptides from human platelets (hPL), obtained from the platelet concentrates containing  $0.55 \times 10^{11}$  platelets. Electrophoresis in polyacrylamide gel with sodium dodecyl sulfate showed that the complex product of platelet lysate (hPL) contained proteins with a molecular weight 60–70 kDa, proteins with weight 20–25 kDa and low molecular peptides with weight 7.61–10.47 kDa [4; 9]. During the experiment we used the hen egg-white lysozyme (Sigma Aldrich, USA) solution with concentration 50 µg/ml in sterile 0.15 M NaCl, and native blood serum sampled from 20 donors (with working concentration (50%) in 0.15 M NaCl).



Biofilm formation was studied on the basis of photometric method. For gram-positive staphylococci we applied the method Knobloch J. K. et al. [5] and for biofilm-forming strain of *E. coli* — the method proposed by O'Toole G. F. et al. [11]. Intensity of biofilm staining was measured with a photometer «Multiscan Ascent» (Thermo Electron Co., China) at  $\lambda=570$  nm. Intensity of staining corresponded to the degree of biofilm formation in the examined bacterial strains.

Bacteria resistant to the innate immunity factors (blood serum, lysozyme, antimicrobial platelet peptides) were selected as follows — after incubation of bacterial suspension (0.1 as per MFarland) with lysozyme (final concentration 25  $\mu\text{g/ml}$ ), blood serum (final concentration 25%) and product of platelet lysate (20 mg/ml) during 30 minutes at 37°. Inoculum was sown in solid culture medium. On the following day CFU was estimated, all cells were harvested (suspensions were standardized) with optical density  $\text{OD}_{540}=0.2$  in spectrophotometer.

In order to estimate the degree of bacterial hydrophobicity, we used the method of separation of cell suspension in two-phase system “liquid-liquid” with immiscible water phases in 0.15 M sodium chloride solution, enriched with polyethylene glycol (PEG 6000; with concentration 4.5%) and dextran (T500; with concentration 6.2%) [3]. For standardization of results, they were expressed in absorbance units (AU). Absorbance unit is equal to decimal logarithm of ratio between optical densities of upper and lower phases containing bacteria during separation of suspension into two phases, with volume of 1 ml each, measured by spectrophotometer, at  $\lambda=540$  nm.

Measuring the electrokinetic potential (zeta-potential, mV) of bacterial cells was carried out on the basis of amplitude-frequency method, with the use of Zetameter-1M (Russia) in its normal operating mode (voltage — 10 V, frequency — 0.2 Hz), by measuring the oscillation amplitude of 50 bacterial cells in microelectrophoresis chamber (size: 22×22 mm, height 0.2 mm) and by calculating the average values of zeta-potential for strain according to Smoluchowski's approximate formula [14]. The obtained results were subjected to statistical processing by methods of variation statistics and correlation analysis [6].

### Results

The use of a single methodological technique — measuring two indicators of physicochemical properties of bacteria (hydrophilic-lipophilic balance and zeta-potential) — allowed us to estimate the value and direction of conversion of physicochemical properties of biofilm-forming bacteria resistant to the innate immunity factors (lysozyme, blood serum, low molecular weight platelet peptides).

On average, low values of hydrophilic-lipophilic balance and electrokinetic potential were typical for intact bacteria: coagulase-negative staphylococci ( $-1.441\pm 0.12$  AU;  $-33.4\pm 0.4$  mV, respectively), *S. aureus* ( $-1.314\pm 0.05$  AU;  $-32.2\pm 0.6$  mV), *E. coli* ( $-0.031\pm 0.04$  AU;  $-14.8\pm 0.2$  mV).

Incubation of bacteria with lysozyme led to the reduction of HLB of resistant *S. aureus* ( $\Delta\text{HLB} = -0.65\pm 0.08$  AU) and the increase of hydrophobicity coagulase-negative staphylococci ( $\Delta\text{HLB} = 0.86\pm 0.08$  AU), but did not influence the hydrophilic-lipophilic balance of *Escherichia coli* ( $\Delta\text{HLB} = -0.09\pm 0.01$  AU). The bacteria resistant to blood serum were more hydrophilic than intact cells. It was typical both for *S. aureus* ( $\Delta\text{HLB} = -0.49\pm 0.11$  AU) and *E. coli* ( $\Delta\text{HLB} = -0.02\pm 0.03$  AU).

However, coagulase-negative staphylococci resistant to blood serum were characterized on average by increase of hydrophobicity ( $\Delta\text{HLB}=0.40\pm 0.11$  AU), in comparison with intact cells.

Incubation of bacteria with a fraction of low molecular weight peptides of platelet lysate (hPL) led on average to the hydrophilization of bacterial surface. So, as compared with intact cells, bacteria *E. coli* ( $\Delta\text{HLB}=-0.11\pm 0.01$  AU) and *S. aureus* ( $\Delta\text{HLB}=-0.60\pm 0.14$  AU) were distinguished by a higher degree of hydrophilic surface. However, this regularity was broken only in case of coagulase-negative staphylococci resistant to antimicrobial platelet peptides. Conversion (shift) of hydrophilic-lipophilic balance of cells, caused by incubation with low molecular weight platelet peptides, contributed to the increase of hydrophobicity of resistant coagulase-negative bacteria ( $\Delta\text{HLB}=0.50\pm 0.12$  AU). Selection of phenotype of staphylococci resistant to lysozyme and bactericidal activity of blood serum was accompanied by the increase of electrokinetic potential in *S. aureus* ( $\Delta z$ -potential= $6.80\pm 0.64$  mV;  $\Delta z$ -potential= $6.64\pm 0.75$  mV, respectively), this was also typical for coagulase-negative staphylococci ( $\Delta z$ -potential= $0.87\pm 0.43$  mV;  $\Delta z$ -potential= $2.95\pm 0.36$  mV). However, as for gram-negative cells of *E. coli*, incubation with lysozyme and blood serum led to the decrease of electrokinetic potential ( $\Delta z$ -potential= $-1.80\pm 0.33$  mV;  $\Delta z$ -potential= $-1.49\pm 0.16$  mV, respectively).

In general, resistance of *Escherichia coli* to antimicrobial platelet peptides was consistent with the decrease of electrokinetic potential ( $\Delta z$ -potential= $-2.45\pm 0.26$  mV), this was also typical for coagulase-negative staphylococci ( $\Delta z$ -potential= $-1.22\pm 0.24$  mV). However, the resistant phenotype of *S. aureus* was distinguished by the increase of electrokinetic potential ( $\Delta z$ -potential= $5.37\pm 0.58$  mV). Correlation analysis was carried out in order to determine the significance of relations between the resistance to the innate immunity factors and the shift (conversion) of physicochemical properties of bacteria. The direction of HLB-shift (conversion) of biofilm-forming coagulase-negative staphylococci correlated with resistance to blood serum and lysozyme ( $r=0.62$ ,  $p<0.05$ ), resistance to blood serum and low molecular weight platelet peptides ( $r=0.43$ ), resistance to lysozyme and low molecular weight platelet peptides ( $r=0.77$ ,  $p<0.05$ ). Correlation between the resistance of coagulase-negative staphylococci to the innate immunity factors and the shift of electrokinetic potential was significant only for the staphylococci, which were resistant to blood serum and lysozyme ( $r=0.57$ ,  $p<0.05$ ).

As for *Staphylococcus aureus*, which were resistant to the innate immunity factors, we noted a stronger correlation between conversion of hydrophobicity and resistance to blood serum and lysozyme ( $r=0.73$ ,  $p<0.05$ ). As compared to coagulase-negative staphylococci, a significantly higher correlation coefficient was revealed between the shift of electrokinetic potential of *S. aureus* cells resistant to blood serum and lysozyme ( $r=0.76$ ), to blood serum and low molecular weight platelet peptides ( $r=0.60$ ), to lysozyme and low molecular weight platelet peptides ( $r=0.70$ ). Correlation of conversion direction of hydrophobicity in *E. coli* resistant to the innate immunity factors was significant only for bacteria resistant to lysozyme and low molecular weight platelet peptides ( $r=0.70$ ,  $p<0.05$ ).

### Discussion

Thus, comparative analysis of conversion of physicochemical properties of biofilm-forming bacteria, which are resistant to the bactericidal activity of blood serum, lysozyme and fraction of low molecular weight platelet peptides, showed that formation of resistant phenotype correlated with low hydrophilic of the bacterial surface and high values of electrokinetic potential. Conversion of physicochemical properties of bacteria during incubation with blood serum, lysozyme and fraction of low molecular weight platelet peptides is unidirectional and contributes to the decrease

of hydrophilic cells. The shift of physicochemical properties of bacteria increases in the range — *E.coli* < *S.aureus* < coagulase-negative staphylococci.

Exposure to conversion (shift) of physicochemical properties of bacterial surface in interaction with the innate immunity factors is typical more for staphylococci than for *Escherichia coli*.

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## Definition the frequency of gene polymorphism G2014 A ESR- $\alpha$ and its significance in the pathogenesis of osteoporosis

**Abstract:** The results of the genetic analysis showed that the frequency of ESR1 gene alleles studied in patients and controls was significantly different. It was revealed that in the basic group the association of polymorphism rs 2228480 ESR1 gene plays an important role in the osteoporosis (OP). The presence of an allele “A” and hetero/homozygous genotypes (G/A and A/A) of this polymorphism significantly increases and carrier allele genotype G and G/G lowers the risk of OP.

**Keywords:** single nucleotide polymorphisms, association, polymorphism rs2228480, ESR1 gene osteoporosis.

**Introduction.** Osteoporosis (OP) — has a complex pathogenesis is multifactorial disease characterized by low bone mass and bone microstructural rearrangement, leading to increased bone fragility and risk of fracture [3; 8]. The causes of osteoporosis and osteoporotic fractures can be a genetic background, environmental factors and their interaction [3; 6; 7; 9].

To date, a number of genes examined, each of which, alone, having little effect in combination with other genes contributes to the overall phenotype of the patient. Among many candidate genes involved in the regulation of bone metabolism, an important role belongs to the estrogen receptor gene (ESR) [1; 2].

The effect of estrogens on bone tissue mediated by their binding to specific receptors localized in the cytoplasm and nucleus of cells. Estrogen receptors belong to the superfamily of nuclear hormone receptors are ligand-inducible transcription factors. Currently we identified two types of estrogen receptors — ESR- $\alpha$  and ESR- $\beta$ , encoded by a single gene that is expressed in osteoclasts, osteoblasts and stromal cells. There is also evidence of the predominance ESR- $\alpha$  in the cortex, and ESR- $\beta$  in the trabecular compartment of the bone [4; 5].

Molecular mechanisms of action of estrogen on bone, not-depite numerous studies, are not fully understood and require further research [4; 5].

**The aim of this study** was to determine the association of polymorphism rs2228480 ESR1 gene with the risk of osteoporosis.

**Materials and methods of research.** In total, this study involved 235 people were living in Uzbekistan, of which 98 patients with OP and the control group consisted of 137 conditionally healthy individuals with no history of fractures.

The diagnosis of OP was set on the basis of clinical, radiological and densitometric studies. Genomic DNA was isolated from peripheral blood samples. DNA extraction was performed using a DNA extraction kit “AmpliPraym Ribo-prep” (LLC “Next-Bio”, Russia), in accordance with the manufacturer’s instructions. Qualitative and quantitative evaluation of DNA held spectrophotometer NanoDrop-2000 (Thermo Fisher Scientific, USA).

Testing polymorphic locus 2014G> A (rs2228480), ESR1 gene PCR was performed on a real-time thermocycler Rotor Gene

6000 Model 65N0–100 (Australia) using a test system of “Synthol” Cat. №-NP-551-100 (Russia), in the manufacturer’s instructions.

Statistical analysis of the results carried out using the statistical software package «OpenEpi 2009, Version 2.3» and «Doctor Stat 2013».

**Results.** The statistical analysis of allele frequencies and genotype polymorphism 2014G> A ESR gene between the main and population groups showed statistically significant differences. The frequency distribution of wild homozygous G/G genotype at OP was markedly lower than in the control (49,0% vs. 67,9%,  $P < 0,005$ , OR = 0.45 [0.27–0.77]), that It can be considered as a protective factor against the risk of OP in carriers of this genotype (Table. 1). Frequency distribution of the genotype heterozygous G/A ESR1 gene in patients with OP up 42.9% (42/98) and 29.9% in the control group (41/137), respectively. (OR = 1,76; 95% CI- [1,02–3,02]).

The frequency distribution of rs2228480 genotype A/A ESR1 gene in patients with OP was 8.1% (8/98) in the control group and 2.2% (3/137) respectively. The criterion  $\chi^2$  between the frequencies of genotypes in groups of patients with osteoporosis and control is at 10.46 df = 2 and  $p = 0,005$ , OR = 3.97; 95% CI- [1,03–15,4]. According to the calculated odds ratio the presence of unfavorable genotype A/A significantly increases the risk of OP in 4.0 times (Table. 1). The findings the genotypes G/G + G/A and showed that in patients with OD and the control group was 91.8 (90/98) and 97.8 (134/137), respectively (OR = 0,25;  $P = 0,03$ ,  $\chi^2 = 4,57$ ; 95% CI 0,07–0,98). The findings suggest that there is a protective effect of genotype G/G + G/A in relation to the OP.

Table 1. – The distribution of genotypes and allele frequency of polymorphism G/A ESR1 gene in the population and in patients with osteoporosis

Alleles and genotypes	The population sample (n=137)		Osteoporosis (n=98)		$\chi^2$	p	OR	95% CI
	n	%	n	%				
G	227	82,8	138	70,4	10,2	0,001	0,49	0,32-0,76
A	47	17,2	58	29,6			2,03	1,31-3,15
G/G	93	67,9	48	49,0	10,5	0,005	0,45	0,27-0,77
G/A	41	29,9	42	42,9			1,76	1,02-3,02
A/A	3	2,2	8	8,1			3,97	1,03-15,4
G/G+G/A	134	97,8	90	91,8	4,57	0,03	0,25	0,07-0,98
G/A+A/A	44	32,1	50	51,0	8,51	0,004	2,20	1,29-3,76

At the same time, examining the genotypes of G/A + A/A, we obtained the following values of the indicators in the group with control and OP: 51.0 (50/98) and 32.1 (44/137), which indicates that genotype data statistically significantly increased risk of OD 2.2 times (OR = 2,2;  $p = 0,004$ ,  $\chi^2 = 8,51$ ; 95% CI 1,29–3,76).

As a result of statistical analysis of polymorphism rs 2228480 alleles of ESR gene showed that the frequency of occurrence of G allele is Osteoporosis in 70.4%, whereas in the control group, 82,8% (OR = 0,49; 95% CI-0,32–0,76). The study also revealed that detection of the unfavorable allele «A» Group to OP and control was

29.6% and 17.2%, respectively ( $\chi^2 = 10,2$ ;  $p = 0,001$ ; OR = 2,03; 95% CI 1,31–3,15).

Thus, the above results indicate a unique association ESR- $\alpha$  gene polymorphism G2014A with osteoporosis risk.

#### Conclusion:

1. Our results suggest an important role of the polymorphism rs2228480 ESR1 gene in the formation of OP.

2. The presence of an allele “A” and hetero/homozygous genotypes (G/A and A/A) of this polymorphism significantly increases and carrier allele genotype G and G/G lowers the risk of OP.

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## The growing and branching model of ephemera of central Asia

**Abstract:** It has been described a model of branching and growing of 22 species of ephemers from 4 families: *Asteraceae*, *Brassicaceae*, *Chenopodiaceae*, *Fabaceae* of Kyzylkum desert. It has been distinguished 5 types of shoots growing: monopodial with apical and lateral-apical dominance, hemisymphodial, sympodial and pseudo dichotomy in generative period of ontogenesis. It has been given a range of variety signs by 8 morphological indexes. The description was confirmed by 19 figures — schemes. It has been noted a predominance basitonic branching.

**Keywords:** growing model, branching, generative period, ephemeral, Kyzylkum.

### Introduction

The shoot system structure is an important characters hereditary fixed feature of biomorphs, reflecting of meristem the activity in the growing. F. Halle (1975) has invented the term and defined the porpoise of “architectural model” as accounting of structure formation, i. e. growing strategy, fixed by the genetic code. “Architectural model” — is not a synonym of life forms, but one of its essential indexes, visually reflecting the formation process.

### Material and methods

At determination of the growing and branching models, we proceeded from the definition of I. G. Serebryakov (1964), A. E. Vasilyev et al. (1988) and M. V. Markov (1989) for herbaceous plants. On the basis of growing, branching and growing analysis among ephemera, it has been distinguished 5 architectural models dramatically differ in growing form and habitus.

### Results and discussion

**I. Monopodial growing with apical dominance, type of  $L_2 < 1/2/L_1$**  ( $L_1$ —shoots of the first order;  $L_2$ —shoots of the second order). It includes plants with clear terminal (apical) domination, well-developed the 1-order shoot.

*Isatis minima*. Height of the plant upon the average is 18,5 (12–85) cm. First internodes shortened, following elongated — 2–3 cm alternate. Acrotonic branching, up to II orders. The length of the shoots of the II order — 1–3 cm. Number of metameres on the shoots of the I order — 10–14, on the shoots of the II order — 4.

*Isatis violascens*. Height of the plant upon the average is 35 (14–60) cm. First 3 internodes shortened, following internodes 2,0–2,5 cm long, alternate nodes. Branching is mesotonic to 2 orders. The II order shoots of 1.5–5 cm (up to 8) in length. On the I order shoots of with 8–12 metameres, on the II order shoots of with 2–14 metameres (Fig. 1 a, Table 1.).

*Senecio subdentatus*. Height of the I order shoot are 18–25 cm. Acrotonic branching to the II order, nodes are alternate. Lower

10–12 internodes are shortened, length is 0,5–1 cm, following internodes up to 2–5 cm. Branching is to 2–3 orders (Fig. 1 b).

**II. Monopodial growing with lateral-apical dominance  $L_2 < L_1$ .**

*Consolida paradoxa*. Plant height of 15–20 cm. Basitonic branching to III orders. Alternate nodes. Internodes of the I order 1.5–2.5 cm in length. The II order shoots are sparse (1–2), 1–8 cm in length (Fig. 1).

*Strigosella africana*. Height of the I order shoot 7–15 cm. Mesotonic branching with 3 nodes to 2–3 orders. Lower nodes close together, internodes — 0.5 cm in length, following, alternate internodes — 1–3 cm in length. The II order shoots up to 12 cm in length with 7–10 metameres (Fig. 1 e, 3 a).

*Strigosella grandiflora*. The I order shoots upon the average is 35 cm (8–80) in height. Basitonic and mesotonic branching up to III–IV orders. At the base of the I order shoot nodes close together, leaves form a rosette. Sometimes branching starts with a cotyledonary node. Above internodes elongated: 1.5–4 cm. On the shoots of the I and II orders long internodes alternating with short (Fig. 3 b).

*Londesia eriantha*. Height of the I order shoot of 7–15 cm. Basitonic branching to 2–3 orders. Lower nodes close together, following internodes 1–1.5 cm long. On the I order shoots 15–25 metameres, on the II order shoots 10–18. Long internodes sometimes alternate with shorter (Fig. 1 d).

*Tetracme recurvata*. Height the I order shoot of 7–10 cm. Basitonic branching to the II orders. Lower nodes close together, 3–5 internodes 1–2 cm long. There is an alternation of long and short internodes. On the shoot of the I order 15–25 metameres on the shoot of the II order 7–12 metameres (Fig. 1 g).

**III. Hemisymphodial growing with apical-lateral dominance  $L_1 = L_2$ .** The I order shoot developed, but not exceed II order shoots, which are equal to or greater than the length.

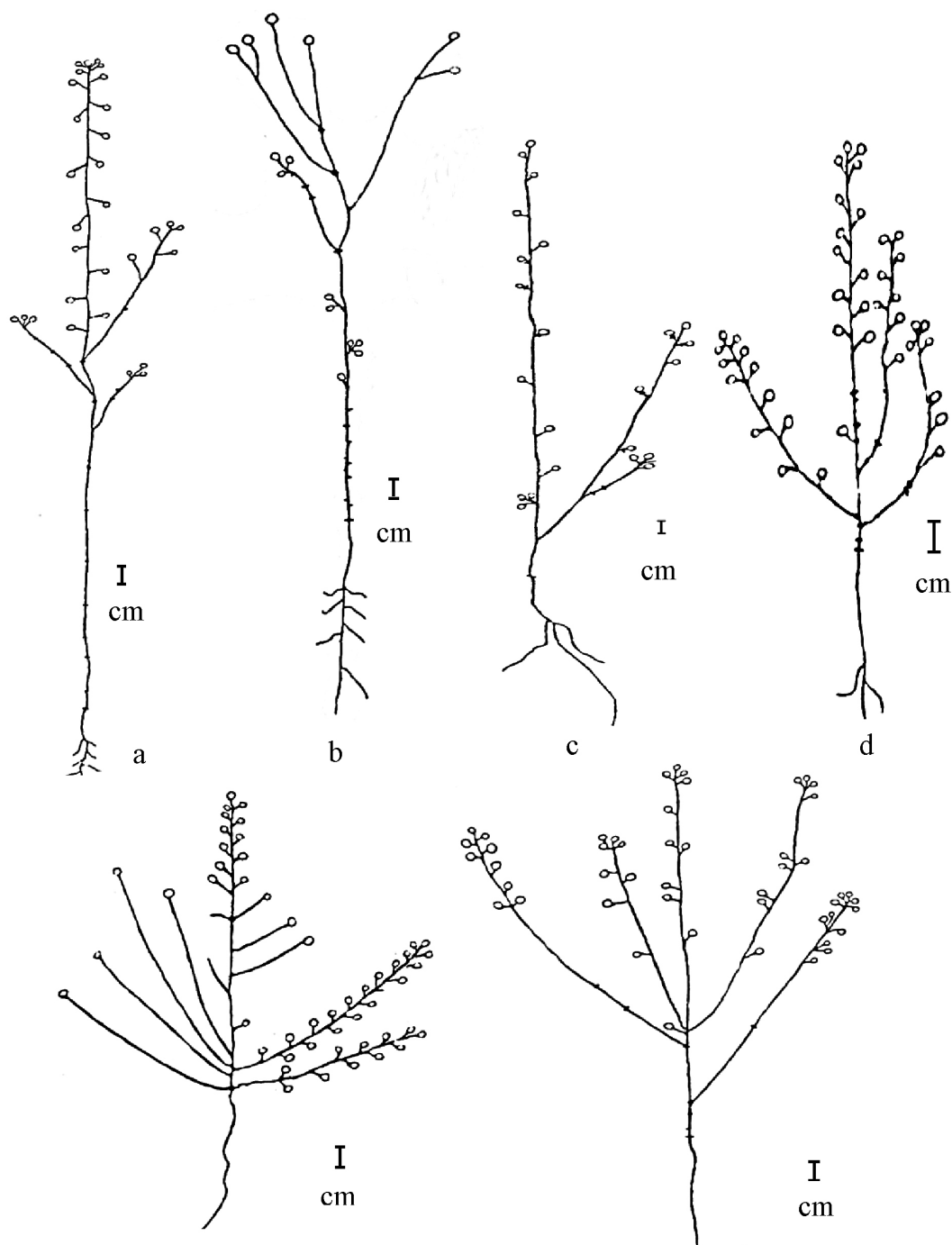


Figure 1. Monopodial (apical) (a, b) and lateral-apical rising (c-d): a – *Isatis violascens*; b – *Senecio subdentatus*; c – *Consolidida paradoxa*; d – *Tetracme recurvata*; e – *Londesia eriantha*; f – *Strigosella africana*

*Alyssum dasycarpum*. Height the I order shoot of 10–15 cm. 2–3 shoots of the II order moving away from the base, 5–15 cm long. Alternate nodes. Basitonic branching to 3 orders (Fig. 2 a).

*Alyssum szovitsianum*. Height the I order shoot of 3–5 cm in length, sometimes not expressed. The II order shoots 5–7 cm in length, developed with 2–4–7 contiguous nodes, internodes are short. Basitonic branching to III orders (Fig. 2 b).

*Amberdoea turanica*. Height the I order shoots of 15–20 cm. The lower internodes short (0,2–0,3 mm). Shoots of the II order laid from 1 node, the first shoots are oriented plagiotropic-orthotropic, following orthotropic. Shoots of the II order 5–6, they are equal to or greater than the length of the shoots of the I order. Basitonic branching up to 5 orders. Lower internodes on the shoots of the II order shorter (0.5 mm), following — up to 3–5 cm (Fig. 2 g).

*Goldbachia laevigata*. Height the I order shoot of 7–15 cm. The lower nodes (5–8) are close together, leaves form a rosette. Following internodes elongated (1–2 cm). The II order shoots in the amount of 3–4 are formed with 9–10 nodes. The length the II order shoots 8–12 cm. Their internodes are elongated (1,5–3 cm). Mesotonic branching to 3 orders.

*Leptaleum filifolium*. Height the I order shoot of 5–10 cm, but anisotropic (orthoplaiototropic) position appears below. The first internodes are elongated (1–1.3 cm), branching begins with the 1 node, but the maximum number the II order shoots developed from 3–4 nodes (7–8 cm long). Basi-mesotonic branching to III orders.

*Meniocus linifolius*. Height the I order shoot of 7–12 cm. Shoots of the II order 5–7 cm longer than those of the I order. Branching is basi-mesotonic to the III order (2 d).

*Strigosella grandiflora*. Height the I order shoots of 35 cm (8–80). Branching is basitonic or mesotonic up to III–IV orders. At the base the I order shoot nodes close together, leaves form a rosette.

Sometimes branching from the cotyledon node. Above the internodes elongated, 1.5–4 cm. On shoots of the I and II orders long internodes alternating with short (Fig. 3b).

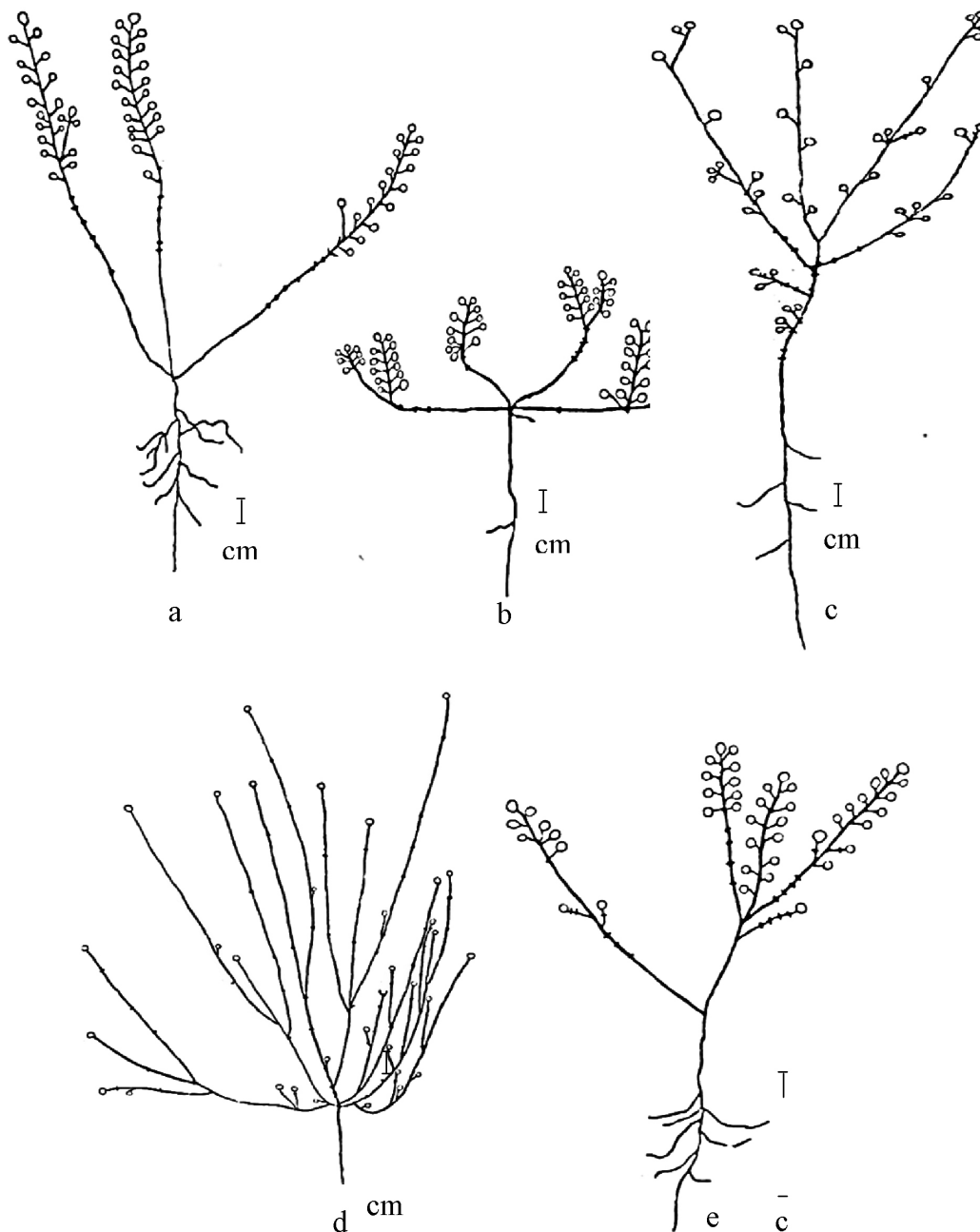


Figure 2. Hemi cymose rising: a – *Alyssum dasycarpum*; b – *A. szovitsianum*; c – *Diptychocarpus strictus*; d – *Amberboa turanica*; e – *Memiocus linifolius*

**IV. Sympodial growing with lateral dominance.**

*Onobrychis tavernierifolia*. Height of plant is 4–5 cm. The I order shoots stops to grow in the budding-flowering phase (length 2 cm). Habitus is formed at the expense of lateral shoots 5–10 cm long. Branching is basitonic to the II orders (Fig. 3c).

*Streptoloma desertorum*. Height of plant is 5–10 cm. The I order shoots shortened. On the rosette 6 adjacent nodes. Subsequent internodes 0,5–1,5 cm in length. Branching is basitonic to the III orders (Fig. 3g).

**V. Sympodial, pseudo-dichotomous.**

*Spergularia microsperma*. Height of plant is 5–8 (10) cm. The I order shoot is not expressed. Branching is basitonic pseudo-dichotomous from the cotyledon node up to the 4 (5) orders. The

first 2 internodes of the shoot of each order short (2–3 mm), the subsequent elongated, 1–2 (3) cm. Shoots of the II order multiple (5–7), 5–10 cm long.

*Spergularia sperguloides*. Height of plant is 5–8 (10) cm. The I order shoot is not expressed. Branching from the cotyledon node up to 4 (5) orders. The first 2 internodes of the shoot of each order short (2–3 mm), the subsequent elongated 1–2 (3) cm. Shoots of the II order multiple (5–7), 5–10 cm long. Branching is basitonic pseudo-dichotomous.

*Garhadiolus papposus*. Height of plant is 5–10 cm, branching to 3 (4) orders. The shoot of the I order is not expressed. Shoots of the II order not numerous (2–3). Branching is basitonic pseudo-dichotomous. (Fig. 4 b).

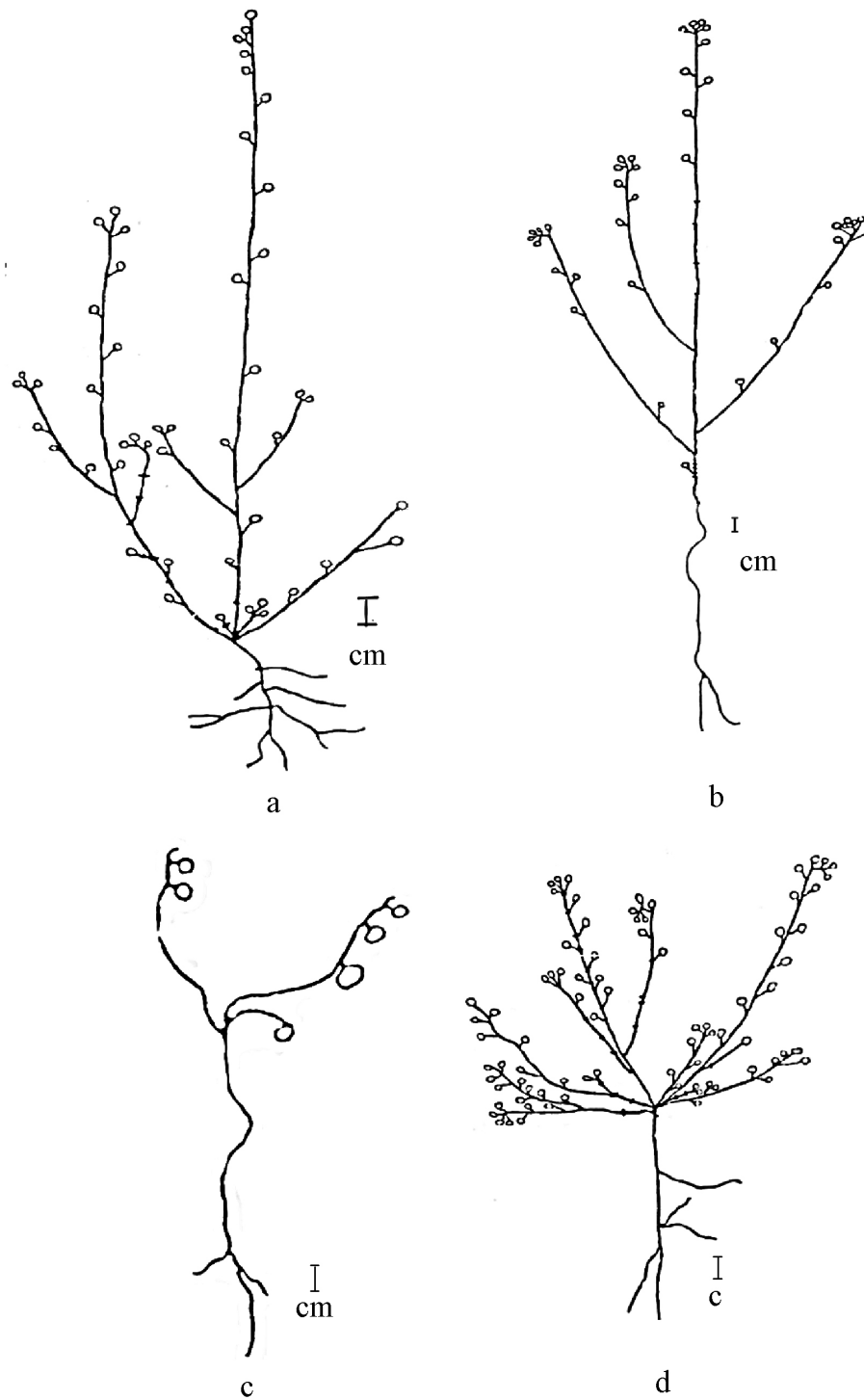


Figure 3. Sympodial (lateral-apical) rising: a – *Strigosella africana*; b – *Strigosella grandiflora*; sympodial: c – *Onobrychis tavernierifolia*; d – *Streptoloma desertorum*

*Heteracia szovitsii*. Height of plant is 5–10 cm, the I order shoots is not expressed (1 cm long). The II order shoots not numerous 2–3 (4), 10–20 cm long. Branching is basitonic, pseudo-dichotomous, up to IV–V orders (Fig. 4 a).

*Tauseria lasiocarpa*. Height of plant is 10–25 cm. The first internode short (0,5 cm), 5 following elongated — 2–5 cm branching begins with 5–6 nodes. The I order shoot is bended; the II order shoots become equal to or dominant position. Branching up to V orders, length of the II order shoots of 10–15 cm (Fig. 4 g).

**Conclusion**

Thus, the types of growing are varied in ephemera: from monopodial to pseudo-dichotomous. Basitonic branching (72% of the

species) is dominant. However, this sign may vary: from monopodial under stress conditions from sympodial at favorable conditions, as well as plant height varies widely, for example in *Strigosella grandiflora* from 8 to 80 cm. Numbers of internodes and their length vary respectively. The most common branching — to the III orders. In general, for the ephemeres it is typical lability of all growing processes, including metric readings of the shoots, internodes and quantitative: number of internodes, the branching order. A wide range of variability of signs I. I. Schmalhausen (1968) refers to the accommodation of growing and sees it as one of the manifestations of the evolutionary process, which increases the adaptive level of biomorphs.

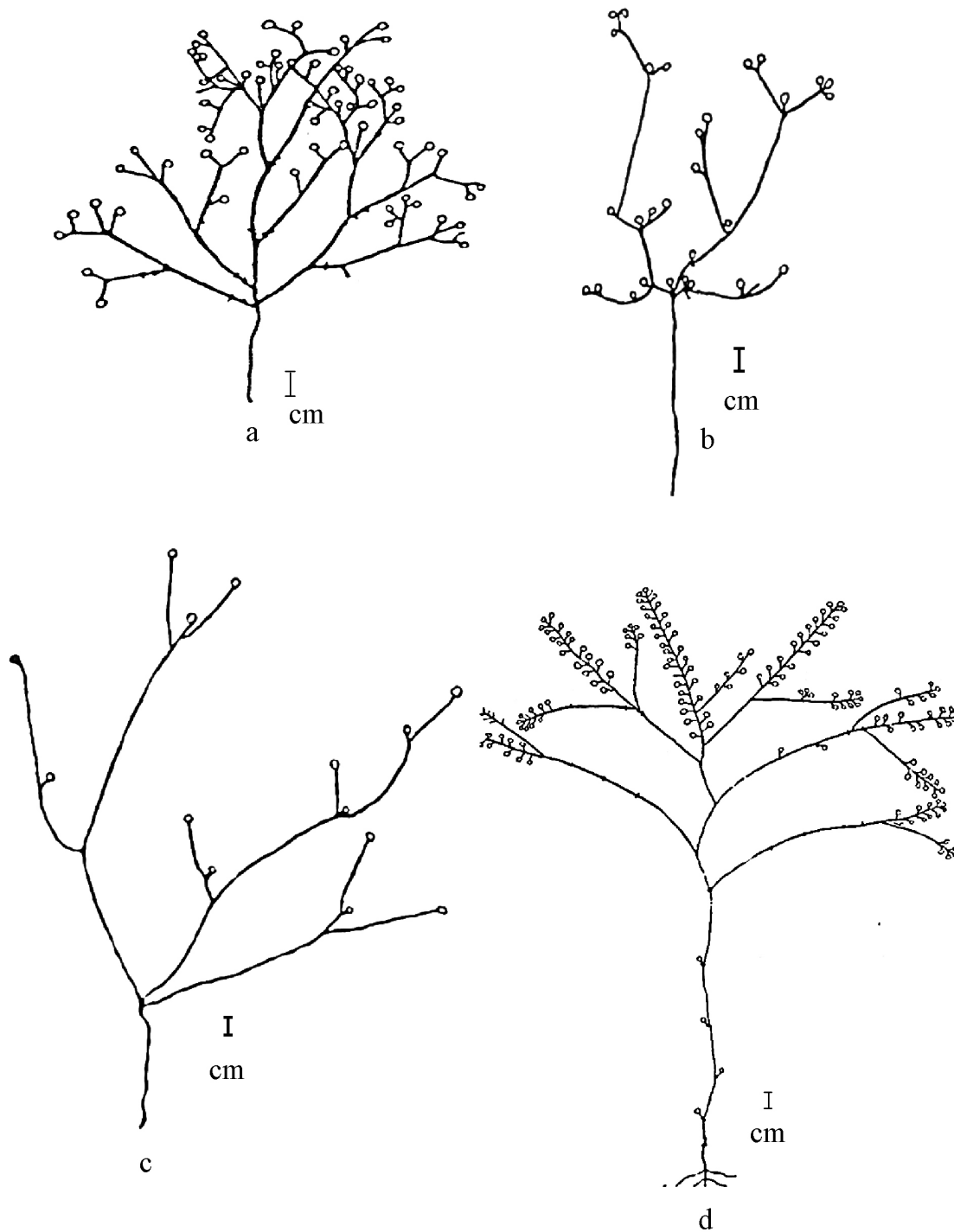


Figure 4. Pseudo-dichotomous rising: a – *Spergularia microsperma*; b – *Garhadiolus papposus*; c – *Heteracia szovitsii*; d – *Tauseria lasiocarpa*

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Table 1. — Morphologic readings of ephemers

№	Grow type	Species	The I order shoot			The II order shoot					Growing type
			length, cm min.-max.	Meta-meres numbers min.-max.	Internodes length, cm, min.-max.	Grow-ing node	length, cm min.-max	Meta-meres numbers min.-max.	Meta-meres length, cm	max. order of growing	
I	Monopodial, apical	<i>Isatis minima</i> Bunge	12-55	10-14	3	5	1-3	1-4	3	2	acrotonic
		<i>I. violascens</i> Bunge	14-60	8-12	2	3	1,5-5	2-4	2	2	basitonic
II	Monopodial, lateral, apical	<i>Senecio subdentatus</i> Phil.	18-25	15-20	2,5	10-13	5-7	3-5	7	3	acrotonic
		<i>Consolida paradoxa</i> Nevski	15-20	10-16	2,5	2	1-10	5-8	2,5	3	basitonic
		<i>Londesia eriantha</i> Kar. & Kir.	10-15	20-30	2	1-5	5-8 (10)	10-20	0,5-1	2-3	basitonic
		<i>Strigosella africana</i> (L.) Botsch.	7-15	10-15	3	3	12	7-10	4	2-3	mesotonic
		<i>S. grandiflora</i> Bunge Botsch.	8-80	15-20	5	1-7	5-20	5-13	2,5	3-4	basi-and mesotonic
		<i>Tetragmone e recurvata</i> Bunge	7-10	2	2	3	3-5	5-10	1-2	2	basitonic
		<i>Alyssum dasyacarpum</i> Stephan ex Willd.	10-15	8-12 (20)	0,5-5	2	5-15	12-16	6	3	basitonic
III	Hemisym-podial	<i>Alyssum szovitsianum</i> Fisch. & C. A. Mey.	3-15	5-8	3	2-4	5-7	2-8	1,5	2	basitonic
		<i>Amberboa turanica</i> Iljin	15-20	5-10	7	1	10-15	5-10	5-7	5	basitonic
		<i>Diptychocarpus strictus</i> Trautv.	10-14	10-15	0,5-3	6-7	5-10	7-10	1-3	3	mesotonic
		<i>Epilasia hemilasia</i> (Bunge) Grossh.	5-20	8-10	4	5	2-10	3-5	5	3	basitonic
		<i>Goldbachia laevigata</i> DC.	7-15	15-20	1-2	9-10	10-15	8-12	1-3	3	mesotonic
		<i>Leptaleum filifolium</i> DC.	5-10	8-12	0,3-1,5	1	6-7	7-10	0,5-1,5	3	basitonic
		<i>Meniocus limifolius</i> (Willd.) DC.	7-12	10-15	0,3-2,5	2-4	5-7	10-15	0,5-3	3	basi-mesotonic
IV	Sym-podial, lateral	<i>Onobrychis tavernierifolia</i> Stocks ex Boiss.	2	3-5	0,5-1	1	5-10	3-4	1-3	3	basitonic
		<i>Spergularia microsperma</i> (Kindb.) Vved.	3-4	5-8	0,5-1,5	1-2	7-12	7-12	0,5-1,5	3	basitonic
V	Pseudo-di-chotomous	<i>Heteracia szovitsii</i> Fisch. & C.A.Mey	1	1-3	0,5	1-2	10-15	2-3	5-10	4-5	basitonic
		<i>Garhadiolus papposus</i> Boiss. & Buhse	1	3	0,2-0,3	1	1-15	1-3	1-1,5	3-4	basitonic
		<i>Spergularia microsperma</i> (Kindb.) Vved.	5-8		0,5-2 (3)	1	5-10	5-10	0,5-2,5	5	basitonic
		<i>Tauscheria lasiocarpa</i> Fisch	10-25		0,5-5	5-6	10-15		1-5	5	acrotonic

## Section 3. Geography

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### The issue of protection of anthropogenic landscape intermountain basins Central Asia

**Abstract:** The current issues of man-made landscapes, which are widespread in large intermountain basins of Central Asia, which constantly maintain and manage human activities. It is noted that intermountain basin is rich in minerals and construction materials. As a result of mining any man-made landscapes, habitats and areas is constantly increasing. Reclamation of man-made landscapes is essential in the optimization of their condition and the protection of ecological environment. It is recommended to develop a network of nature reserves, game reserves, national parks and recreational reserves.

**Keywords:** protection of man-made landscapes, recreational reserves, reclamation of technogenic geocomplexes, optimization and security, environmental protection measures, national parks, ancient residential landscapes, archaeological sites, salinization, related phenomena.

Anthropogenic landscape complexes — irrigated agricultural, residential, industrial, water, rain-fed agriculture, travel, recreation, ancient residential — an integral part of the structure of modern natural complexes whose functioning is constantly maintained production and economic activity. The complexity of the structure and different anthropogenic landscapes in the organization and management of security systems requires special attention to the originality of its natural conditions and the zonal and regional peculiarities [1, 46–51].

Issues of protection of man-made landscapes are highly relevant, as well as the protection of natural systems. Ongoing support health and integrity of anthropogenic landscapes at a high level, resolution and management — it is air protection residential and industrial landscapes from pollution, water landscapes (reservoirs, ponds and irrigation canals) from a strong destruction of biomass, siltation and pollution from agricultural landscapes drought and dry winds, wind and water erosion, secondary salinization and water logging, the organization of recreational reserves, reclamation of natural and man-made systems, etc. These activities contribute to the economic potential of all categories of transformed landscapes. On this occasion D. L. Armand writes: “In nature can be affected so that any changes made to it will result in only partial changes in its enrichment. But for this you know well its mechanism. And it is much more difficult than the cleverest cybernetic machine” [2, 19–20].

In heavily transformed landscape complexes, along with positive changes and negative changes occur. Therefore, in the structure of man-made landscapes are often observed disturbed landscapes, is a product related phenomena positive impact of human activities on the environment. Anthropogenic badlands, gullies on loess heavily eroded and eroded gray soils, irrigation ravines, secondary salinization and wetlands — is the result of related phenomena that occur during development, irrigation and the use of landscape complexes. Therefore, the complexity of the mechanism of nature requires enormous labor and knowledge, scientific soundly measures used in the rational

use of natural resources, identify regional patterns and their differentiation, and anticipate the expected changes and related phenomena, as well as their impact on geographically contiguous landscapes.

Large intermountain basins of Central Asia are quite rich in minerals and construction materials, widely used in the national economy. In geocomplexes mining areas as a result of the general mining has changed dramatically, and any man-made (career-dumping) complexes, habitats and areas from year to year. Reclamation of man-made landscapes is of great importance to optimize their system and environment. Land reclamation is now becoming more and more landscape-ecological and environmental aspects. It is seen not only as a measure to increase the area of agricultural land, but also as a system of measures aimed at restoring the entire chain of damaged natural bonds or to establish a violation to more stable, highly productive and natural and economic systems [3, 139–144]. Man-made landscapes, are subject to reclamation in Karatepa, Agalyk, Ingichka, Zarmitan, Mardjanbulak, Koytash (Samarkand Basin) Kyzylkiya, Kokyangak, Tashkumyr, Shurab, Sulukta, Haidarkan, Changyrtash (Fergana valley), Uzkyzyl, Lyalmikar, Kokayty (Surkhandarya depression), Chilik Koskuduk, near Panfilov (Ili Basin) and others.

In large intermountain basins special care is also evident in so widespread in Central Asia ancient residential rural and urban landscapes that contains a structure of an ancient man-made landscapes and their formation history. These ancient residential landscapes are Afrosiab, Sapalli, Old Termez, Ayritom, Zartepa, Bandyhan, feels and others are constantly under protection. Some of them declared a state of archaeological reserves, such as Afrasiab.

Thus, the task of caring for Nature Conservation as part of the natural and man-made landscape of the complexes, the combination of which are most pronounced in large intermountain basins of Central Asia. The structure of the intermountain basins, landscapes are so complex and diverse that the activities undertaken for the protection of should take into account their regional and local character

of the natural environment, as well as their characteristic physical and geographic phenomena. “Before we allow the slightest change in any of the components of nature conservationist must ensure that he understands the unity of the natural environment. It must first examine the effects of natural phenomena and conditions, and then choose how to protect natural resources [4, 38–39].

In large intermountain basins of Central Asia and framing their slopes are unique natural objects and samples of typical landscapes requiring conservation and support their optimal conditions. In Samarkand basin and its surroundings such objects are Amankutan gorge — terraced slope-WIDE forest landscapes, upper plane trees — Grove millennial plane trees with powerful springs, Navka — Grove poplar-plane-tree plantations with springs having a large flow rate, a very rare and sporadic in the mountains of Aktau

juniper forest landscape, located in the pool and Takabaysay Tutak-say typical carst landscape on the plateau Kyrktau, outlier-lowland semi-desert landscape with exposures of Paleozoic rocks (Chupana-ta). In general, large intermountain basins of Central Asia are unique not only their individual plots, and are remarkable in terms of nature of each of them [5, 18–20].

The scientific and technical progress, actively and comprehensively affecting the development of the structure and dynamics of landscapes, it is necessary and commandments nationwide cause. In Issyk-Kul basin reserve regime has been operating since 1948, which can be recommended for other major intermountain basins of Central Asia. Consequently, the development of a network of nature reserves, game reserves, national parks and recreational reserves urgent and important problem.

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## Specialization of agriculture — as the solution to the problem of employment (a case study of Samarkand region)

**Abstract:** The agrarian situation of Samarkand city which located in the center of the Republic was studied in the following article. The main meaning of the research is that the author tried to pay attention to the briefly study of agriculture of the region and its place in the Republican agriculture. In addition, it is estimated as main factor of occupancy of the population and development of agriculture. The main factors are indicated for the development of agriculture and specialization according to the analysis. The process of specialization of production of vegetables, cotton, livestock, gardening, tobacco and others branches in agriculture in the districts of the region influenced to the occupancy of population.

**Keywords:** Specialization of agriculture, potential of the region, agro-industrial, agricultural products, agricultural sector, economic development, employment of population.

**Introduction.** Uzbekistan geography scientist professor Abdusami Soliyev said that, this plain is from southern east to the northern west direction, it is considered to be the socio-economical “pavement” and unique root of this historical-geographic area [1]. Samarkand region is one of the important regions to the national economy of Uzbekistan. The provincial agriculture is in the direction of the regional agro-industrial agriculture, and of 75 percent of agricultural GDP [2].

The development of agriculture is depend with Zarafshan River in the region. Zarafshan River is important in providing agricultural crop lands with water and its old tributaries such as, Sazagonsoy, Ohakliksoy, Omonqotonsoy, Qoratepasoy, Urgutsoy, Oqtepasoy, Tosinsoy is of great importance and they are managed

by human [3]. It should be noted that the water regime of the Zarafshan River is much more comfortable to provide water to all kinds of cultural crops during the growing season [4]. The largest water reservoir among water reservoirs built in region is considered Kattakurgan water reservoir. This water reservoir plays an important role in the agriculture of Samarkand and Bukhara regions. This water reservoir provides 94 thousand hectares of area of Samarkand and Bukhara regions with water. As the result, the irrigation supply is enhanced in nearly 150 thousand hectares of area [5].

Agricultural potential of region is high and it is on the 3<sup>rd</sup> place in quantity of agricultural products after Tashkent (12.6%) and Andijan (10.2%) in republic (Table 5). In region cotton-growing,

arable farming, gardening products, grape and tobacco growing are well-developed. It should be mentioned that, in country 96.5% percent of tobacco growing corresponds to share of Samarkand region [6]. It should be noted that the cultivation of tobacco is only in Urgut district of the province.

**Data Analysis.** In the independence years large-scale of reforms were carried out in the country's agriculture. Samarkand occupies the high places among regions according to the key indicators of the agricultural development of the region. 13.3% of total cultivated land of republic, 13.1% of agricultural products produced in the country in 2015 corresponds to the share of this region. Region

occupies the leading places in the republic in the production of grapes (36.5% in comparison to the republic indicator), potatoes (23.1%), vegetables (16.5%), cereals (10.8%), meat (12.3%), wool (12.8%) and milk (12.3%).

Economic development which is taking place in the country is continuing to decrease the share of agricultural products in the GDP. If this figure was 30.1% in 2000 (45.4% in Samarkand region), while in 2015, it decreased to 16.6% (28.7%). 61.7% of regional gross agricultural products conforms to the share of farming products and 38.3% of them corresponds to the share of livestock products.

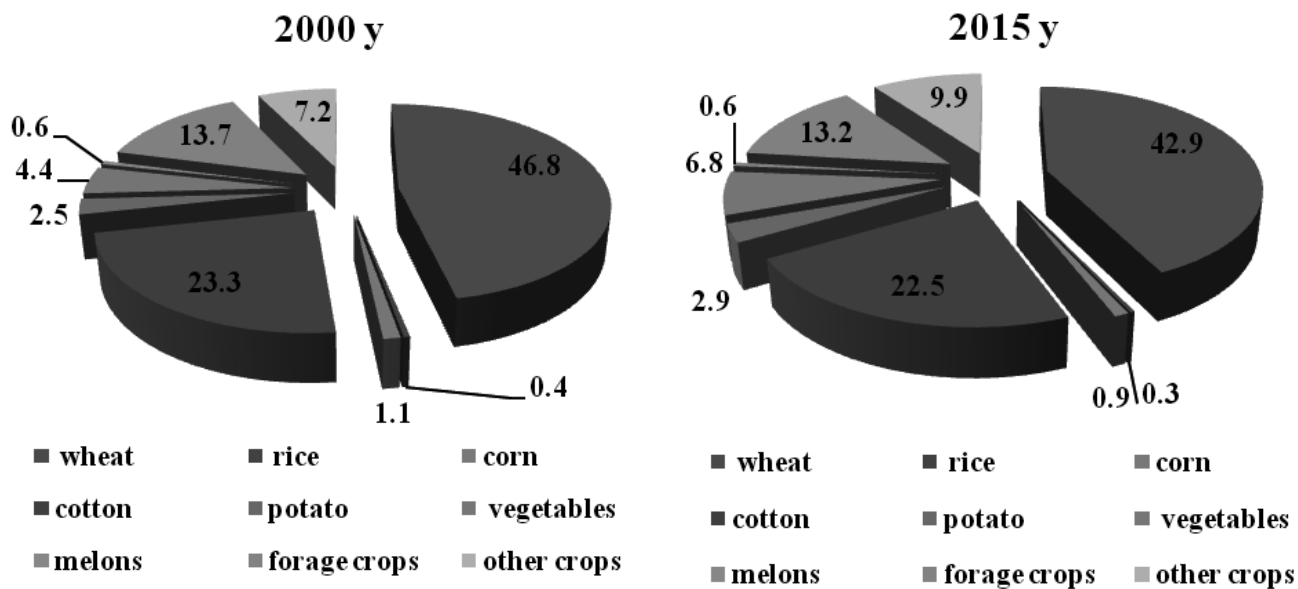


Figure 1. The evolutionary change of crop fields of agriculture in Samarkand region

Source: It was prepared on the basis of data from the State Statistical Committee of the Republic of Uzbekistan

Grain and technical crops occupy a large area in the structure of sown areas of region. In the analyzing period, their share in the structure of the sown areas declined from 78.7 to 69.9 percent, while the share of forage crops has decreased from 13.7 to 13.2 percent. At the same time, the share of the area of potato, vegetable and field crops increased from 7.6 to 10.4% (Figure 1).

The livestock breeding of region improved significantly due to the measures taken in increasing the number of cattle in farms on the basis of Program "Stimulating to increase cattle in the farms, the economy of farmer and personal assistant". In 2000–2015 years, the number of cattle, in particular, the number of poultry has increased extremely (Figure 2).

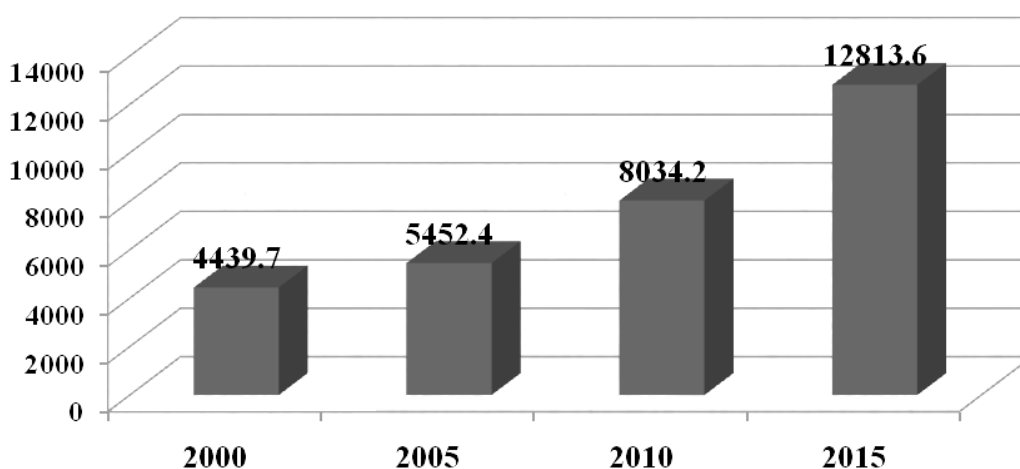


Figure 2. The dynamics of change in the number of cattle in Samarkand region (all categories of farms), thousand numbers

Source: It was made on the basis of information of Statistics Committee of Samarkand region

In many ways the increase in the quantity of agricultural products in the region is associated with the increase of efficiency indica-

tors. The results of the analysis showed significantly rise in the yield of agricultural crops in all types of farms in Samarkand region (Table 1).

Table 1. – The yield of agricultural crops in all types of farms in Samarkand region, c/hectare

The name of products	2000 y	2005 y	2010 y	2015 y	The increase in the years 2000–2015 (times)
Raw cotton	17,9	24,8	24,5	25,0	1,4
Grain	25,7	38,8	45,7	46,0	1,8
Potato	148,1	220,7	258,5	317,2	2,1
Vegetables	213,6	261,6	348,9	446,4	2,1
Fruits	147,4	165,7	226,7	266,3	1,8
Melons	58,2	79,1	102,6	159,7	2,7
Grape	69,2	78,2	116,7	154,5	2,2

Source: It was prepared on the basis of data from the State Statistical Committee of the Republic of Uzbekistan

The positive steps reached in improving the efficiency of agricultural products of the region is in many ways, related to the structural and market reforms carried out in the village.

Table 2. – The structure of cultivation of the main types of agricultural products in Samarkand region, (%)

Products type	All types of agricultural		Agricultural enterprises		Farms		Peasant farms	
	2005	2015	2005	2015	2005	2015	2005	2015
Cotton	100	100	10,7	0,3	89,3	99,7	–	–
Wheat	100	100	8,9	0,7	71,1	79,7	20,0	19,6
Potato	100	100	0,8	0,1	12,1	29,9	87,1	70,0
Vegetable	100	100	4,2	0,3	46,8	56,1	49,0	43,6
Fresh fruits	100	100	8,1	6,1	41,1	49,6	50,8	44,2
Grape	100	100	11,6	0,9	50,7	65,9	37,7	33,3
Melons	100	100	1,0	0,2	43,9	46,8	55,1	53,0
Meat	100	100	2,4	4,5	1,5	3,4	96,1	92,1
Milk	100	100	0,2	0,1	1,9	4,6	97,9	95,3
Egg	100	100	33,8	36,3	13,6	21,5	52,6	42,2

Source: It was prepared on the basis of data from the State Statistical Committee of the Republic of Uzbekistan

In 2005–2015 years, the share of agricultural enterprises in growing cotton reduced from 10.7% to 0.3%, in growing wheat reduced from 8.9% to 0.7%, the share of farms proportionally increased from 89.3% to 99.7% and from 71.1% to 79.7%.

Fruit growing in farms increased from 41.1% to 49.6%, grape growing rose from 50.7% to 65.9% and the quantity of field crops went up from 43.9% to 55.1% (Table 2). Farms maintained their high share in growing potato, grape, fruits, vegetable, field products, meat, milk, eggs according to their essence.

The issues of provision of employment to population in agricultural sector

Due to the economic growth-taking place in our country, we have expressed our opinion about the decline of the share of agriculture in the content of GDP. Exactly the same situation is also relating to the changes in the employment structure. In recent years the share of this sector in the structure of labor resources of region has significantly decreased.

In the process of research territorial content of workers engaged in agricultural production in the structure of labor resources has been studied. In this case, the ratio of people employed in the balance of labor resources, in agriculture and forestry, as well as in farming, is taken to the total labor resources (Table 3).

Table 3. – Employment in the agricultural sector of Samarkand region

The name of the cities and districts	The number of labor resources	For example, employed		The quantity of staffs employed in sector in comparison to the total labor resources, %
		In agriculture and forestry	In farming	
1	2	3	4	5
According to the region	2 033,7	423,1	192,0	30,2
Bulungur	95,9	24,5	11,1	37,2
Jomboy	88,9	22,2	11,2	37,5
Ishtikhan	132,3	29,2	11,3	30,6
Kattakurgan	141,4	34,7	20,7	39,2
Narpay	112,3	26,3	13,6	35,4
Nurabod	77,2	19,9	9,0	37,4
Aqdarya	82,6	21,0	6,1	32,9
Pastdargom	182,3	44,1	16,0	32,9
Pakhtachi	77,0	20,4	16,2	47,5
Payarik	133,7	31,6	16,3	35,9

1	2	3	4	5
Samarkand	130,6	43,6	14,2	44,3
Taylak	102,4	24,2	8,9	32,3
Urgut	255,7	65,3	30,5	37,5
Kushrabod	66,6	16,0	7,0	34,5

Source: It was prepared by the author on the basis of information of Statistics

Committee of Samarkand region

Based on the results obtained, districts are divided into groups according to the quantity of employees employed in this sector in comparison to the total labor resources (Table 4). The largest share of employed in the agrarian sector in the structure of labor resources is recorded in Pakhtachi and Samarkand districts, the lowest indicator is noted in Ishtikhan, Akdarya, Pastdargom, Taylak, Kushrabod district. On the basis of map information the quantity of employed in the agricultural sectors compared to the total labor resources was below evaluated and divided into the criteria (Table 4).

Table 4. – Classification of districts of region on the share of the agricultural sector in the structure of employment

№	Level	Criteria	The name districts
1	Highest	40%дан катта	Pakhtachi, Samarkand
2	High	37–40%	Bulungur, Jomboy, Kattakurgan, Nurabad, Urgut
3	Average	35–37%	Narpay, Payarik
4	Low	35%дан кичик	Ishtikhan, Akdarya, Pastdargom, Taylak, Kushrabod

Along with this, the implementation of carrying out measures concerning the creation of new job places in the agricultural sector in the sphere of employment programs has been studied. In 2015 more than 1/5 part of the total new jobs in Samarkand region is created in the farms. The highest indicators among districts in this area were

observed in Pakhtachi (37.3%), Kattakurgan (37.1), Samarkand (37.1%) and Taylak districts. On the contrary, the low results were noted in Bulungur, Jomboy and Kushrabod areas. We may include Narpay and Taylak districts in the next high places. The figure stood around 30–35% in these areas.

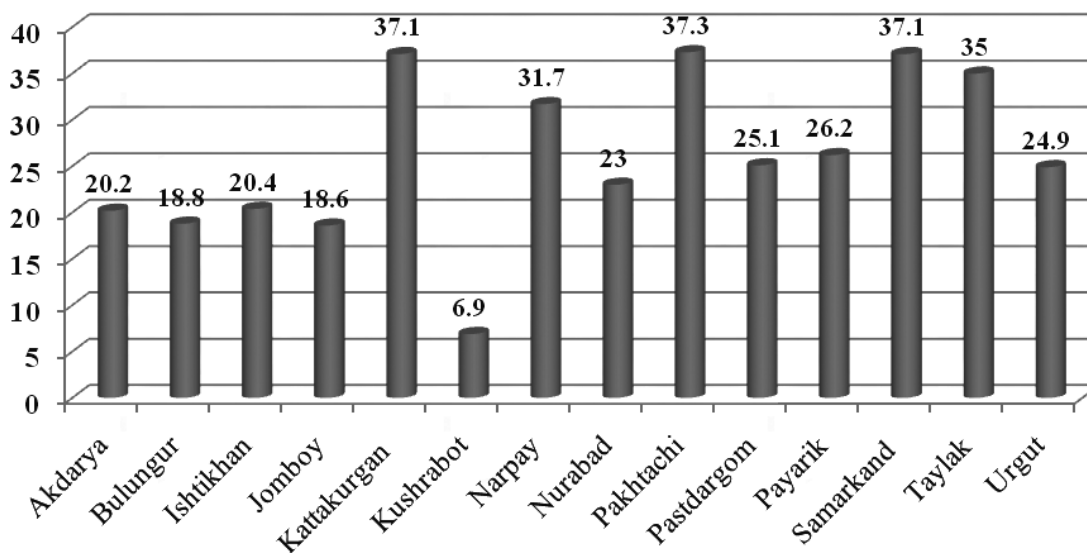


Figure 3. Created job places in farms (compared to the ratio of total new jobs),% (2015)

The next districts entering to the average group are around 25–30%. Pastdargom, Payarik districts are included in this group. Oppositely, Districts with low and the lowest indicator in creating new jobs in the agricultural sector in the sphere of employment programs include remaining districts of region (Figure 3).

**Conclusion.** During research the rapid development of agricultural production in Samarkand region was determined. Attention was given to the significant decline of the share of this sector in the structure of employment and GRP. In the near future this trend of socio-economic development of the region is expected to continue. Different zones were formed according to the natural and climatic conditions of the region, territorial location of population, the quali-

fication of people, the content of crop fields and the fertility of crops. It has the potential to develop intensive agriculture.

According to the results of a survey on the regional location of the types of crops, area of Samarkand province was conditionally divided into 5 agricultural districts. In addition, in the process of research, territorial content of workers engaged in agricultural production in the structure of labor resources had been studied.

In summary, during the research agricultural production in the Samarkand region has rapidly developed. At the same time, the quantity of GRP of this sector and the quantity in the structure of employment has significantly decreased. In the near future of socio-economic development of the region this trend is expected to continue.

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## The problems of doing medical geographic research in Uzbekistan

**Abstract:** Formation and development of studies on medicinal-geographical and medicinal-geocological studies, as well as the natural pestholes are analyzed. The negative influence of geocological situations appeared in Uzbekistan and in the Middle Zarafshan basin on the health of population is illustrated. Testimonial of the anthropogenic pestholes is given.

**Keywords:** medicine geography, nosogeography, landscape criticism of medicine, anthropogenic-landscape, agro-landscape.

It is known that medicine geography is a science, which creates geographic extension of human disease and reasons of opportunities of medical and anthropogenic factors of origin disease. Medicine geography from meaning has several spheres. It consists of spheres like: Nosogeography of its internal part, medical landscape study, medical anthropogenic landscape study, medical geo-ecology, making maps of medicine geography and medical landscape. On the base of all this lies medicine geographic problems which has connection with the influence to each other and relations system of medical condition — society and human health.

It must be admitted that above-mentioned names has each of medicine geographic directions have own research object, subject, purpose, tasks and concept of scientific approach. For example, Nosogeography studies global, zonal and zooms of regional geographic extension of some disease type. Medical land shaft study, difference from nosogeography analyses positive and negative influence of land shaft complexes to the human health, geo-ecologic conditions of negative influence to the human health and formation of tasks on the scientific basis for problems of optimizing conditions, makes maps of medical landscape.

The main purpose of medical anthropogenic landscape study is to morphological study of negative influence to the human health and medical environment which was originated geo-ecologic conditions in techno-gene land shafts where developed mine industry areas, in agro-landscapes, in seliteb land shafts and in the circle of cultural and non cultural land shafts which was created by human in economy activities. It is possible to perform such tasks in the ways of making maps of medical landscapes and through medical geo-ecologic approaches.

According to the published monograph by N, Komilova and A, Soliev “Geography of Medicine” in 2005 medicine geographic divide into districts in the territory of Bukhara region for health of population were done and they divided into four nozo-geographic districts. They are high, middle or central, lower and western medical geographic district. The following principles were taken as a main measure by authors:

1) generality of territorial geographic places; 2) extension degree and specialty of disease group; 3) pointers death of general and child; 4) similarity of medical and ecologic condition; 5) existence of nozo-geographic areal of some territorial disease; 6) territorial economy and their branch structure; 7) administrative-territorial unity and etc. Giving description for divided geographic districts according their territory, number and dense of population, main disease groups characteristics for districts are largely used [1].

Medicine geographic analysis and their sanitarian-hygiene condition of Amudarya delta is deeply investigated by I, Turdimambetov. The main attention in his articles is paid to the following: to medicine geographic mark which was changed medical environment in the influence of human economy activity in Amudarya delta, rising and development of medical biologic and sanitarian-hygiene situation, geographic basis of getting better of appeared ecologic equality, divide into districts of Southern Aral region by disease and to use land shaft principles while doing medical geographic investigation [2].

It was known that appearance and territorial extension of disease among the population depend on medical and economic-social conditions, especially ecologic situation. Such nozo-geographic conditions in some regions have been reason of appearance and geographic extension of several disease. O. Mukhamedov analyzed nozo-geographic condition of Samarkand region through studying territorial extension of main types of disease: breathing organs, neoplasm, stomach organs, system of blood circulation, infectious and parasitic disease which has being reason for the death of human among population (in 2006).

According to his confirmation blood circulation system disease is more extended than other type of disease in the region. It consists of 56,7% of all disease. It was defined high in dense population areas, cities and districts where developed production farms. For example: such disease was about 63.8% and 63.7% in Samarkand and Kattakurgan cities in 2000–2004, about 62.4% in Samarkand district. This situation was recognized very high degree from average degree.

Geography of different disease types was studied according to the statistic information in Surkhandarya region by A. Sattarov, M. Umarova and Z. Kholmatov. They defined that extension of such disease virus hepatitis, tuberculosis of breathing organs and echinococcus last years. As an example: tuberculosis of breathing organs disease was 977 people in 2003, it was increased to 1129 people in 2005 in the territory of region. According to the statistic information such disease is in high level in Termiz, Denov and Shurchy cities. So, the number of penitent who was taken ill by virus hepatitis was also very high level. They were each account of 1000 people 423 people in Termiz, 312 people in Denov, 187 people in Sariosio, 139 people in Shurchi and 135 people in Kumkurgan cities. The author confirms and origin and extension of these disease connects it with medical and economic geographic factors and environmental conditions [3].

The results of scientific investigations done in the circle of medicine geography are show that totally authors approaches as one of the branch of social-economic geography for medicine geography and its research object. That's why, research works of medical geography and nozo-geography, reason of origin disease and their geographic extension, perform which has connection to this tasks in the scientific articles are carried out on the basis of analyzing social-economic factors. But reason of origin of disease, their geographic extension, set in areal places of medical geographic opportunities and different complex land shafts and also connection of medical roots low attention were paid.

We have to emphasize that medicine geography is created under the basis of medical geography, social-economic geography and medical sciences and counted as developed science. According to N, Komilova's and A, Soliev's [1.] ideas if the medicine geography really created under the science of bordering direction, its true that we can count its position in the circle of geography. If exists ap-

pearing hearth of various disease in the nature, we have to analyze on the basis of taxonomic unity system to define them, to give description, to make maps of research work, possibilities of nature of special area or region, structure of relief, microclimate, characters of hydrochemistry and geochemistry of land surface and underground and surface water, plant and animal world and land shaft complex. It is possible to make then by the way of describing them in medical geo-ecologic maps.

If it is carried connectively with research works of medicine geography and directions of medical land shaft study and medical geo-ecology it can make easy to solve problems on medicine geography, produce practical offers and tasks against to the diseases.

If approach to the following investigation on medical land shaft study and medical geo-ecologic point of view, at first: it can give good result of studying and analyzing medical and anthropogenesis hearth of disease in the round of present land shaft complex; at second: it also practical and scientific the influence can be in high degree of taken results and done conclusion.

Following investigation and views shows that medical and anthropogenic hearth of various diseases were not extended equal in each land shaft type places. They can be exist in one of this parts of land shaft or its internal parts of one urochishche or farcies. Tuberculosis, malaria and other local stenachor disease can be examples. But some disease type can be against, they can be largely extended in medicine geographic districts, provinces, zones and countries. Mountain disease, endemic crop, sunburn and other evictor disease can be examples. We think, approaching medical geo-ecologic point of view and doing medical geographic research of medical land shaft study, existed hearth of expanding disease in analyzing objects, making medical geographic maps which was painted areal in different zoom of disease.

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## Comparative study fodder plant in desert condition submontane in semidesert and utilization of amelioration

**Abstract:** The aim of our research was selection and in visitation of eco-biological and economically valuable peculiarities, more perspective prospects of food under their sorts, useful for creation of seed food agricultural lands and haymaking in piedmont semi desert of Uzbekistan. The task of the research contained comparative research of their rise and development, food and seed productivity, and food mass. Practical value of the work was concluded in that for the first time the condition of piedmont semi desert of Uzbekistan. Was given comparative complex mark according to eco-biological peculiarities and economically valuable signs of various prospects and sorts of food dwarf semi shrubs.



**Keywords:** natural condition, climate, pasture, types of food, sand layer, phonology, physiology, harvesting.

**Introduction.** Present situation of desert and semideserts pasture of Uzbekistan be characterized progressive degradation productivity and the quality of stern. Discount to present pass from heaven 260 types of stern plant from natural flora and distinguished more 30 available subshrub, differentiate from productivity and high suitability in extreme condition of desert [1]. Special activity in that acquire comparative from eco-biology research of important types of stern in semidesert, permit to cheat selection most avthailable types, quality of the arid stern plant for the amelioration submontane semidesert in Uzbekistan. In that actual mission and devote that work, itself representational total research of many years about comparative analysis and mark for the different types and quality submontane condition in semidesert in Uzbekistan.

**Aim and mission of research.** The aim of our research report is selection and observation eco-biology and more economical valuable specifics available types of stern in semidesert and its types, suitable for generation drizzle of stern land and haymaking in submontane semidesert in Uzbekistan. In task our research go in comparative study its growth and development, stern and seminal of productivity, mass of stern consist of condition in submontane was given comprehensive mark in Uzbekistan. Feature and economical valuable and differ from valuable of eco-biology of stern in semidesert, concern of ten types of economical family of chenopodiaceous and astrovs — chogon, qomforous, izen, keyruk, wormwood of tereskuni in Uzbekistan. Practical value of our work include basis of research of eco-biology and study different types and quality of semideserts dedicated valuable class and types for using in amelioration semideserts in pasture submontane of Uzbekistan.

Nature condition place where we conducting our exploration. Experimental work perform exsperienced field in Nurota. Experienced field located in zone submontane semideserts in southwest pediment centre of column Nurota its high 660–670 m. Climate characterized with snap rippling daily and annual number atmospheric fall-out with uneven prolapse [2]. Maximum number it prolapse in winter- spring period. Average year fall-out period of average form 206 mm, average years temperature of air is –13,4 degrees, absolute maximum temperature of air 43,1 degrees, absolute minimum is minus 29 degrees, average relative dump of air is 55,4 degrees. Wind principally in north side, after midday speed of wind increased.

Pedogenic breed serve fine-grained and deep deposition of skeleton, which characterized high afforest. In place prevail has light sierozem with wormwood and eferoids association. Content humus in there is 1–1,5%, nitrogen 0,05–0,09%. Horizont where is many gathering carbonate (scaling to lime, from 20%) standi in deep to 20–30 from 60–80 sm. Below plaster available horizont. In submontane semidesert Nurata sweep with eferoids types in semidesert. Base of plant intercession with *Carex pachystylis* J. Gay, *Poa bulbosa* L. *Artemisia, diffusa* Krasch ex Poljak, *Alhagi pseudalhagi* (Beib) Fisch, *Peganum harmala* and first year efemer.

**Object and method of research.** Object of research is 6 types of arid culture- chogon, qamforos, keyruk, izen, tereskina and wormwood. Experimental crop produce in autumn- winter period of year soil beforehand; work up. autumn ploughing in deep 22–25 sm, harrowing in two marking with lack of faith. Accounting field allotment 30m, replication experiment 4 time. In way of crop wide line between rows race 60sm. Norm of sowing for izen 3 kilo, keyruk and tereskina- 5 k, chogon and poliney- 0,5 k, 100% of economical family. Phenological survey according to take method of Beydeman

survival of plant detect by basis of survives number, spring (may) plant and autumn (october) plant, as well asi according to year comparison with number appear sprout vegetation in first year. Plants growth of dynamics by force of monthly by population instrumentation. (100 plants). Crop yield of sterns mass and family detect by method of directive department of sterns culture WIP (1979) and WNII (1978).

**Output and theirs discussion.** Near sunken sowing seed in deserts stern plants ascend early spring in period melting snow. First ascend (2–3 february) komforosma, teresken and polin. after 20 day (in first decade of march) izen, chogon, keyruk. In last years first (2 decade of february) grow komforos, teresken, polin. secondly (in 1–2 decade of march) — izen, chogon, and keyruk. The phrase “beginning of flowering” pass in following sequence: izen — (1 decade of may), Chogon, qamforosma and glasswort (3decade of may), teresken and polin (1 decade june). The seed of chenopodicious culture mature in 3 decade of october, in sequence — teresken- izen — keyruk- chogon- qomforosma, asid of (polin) only in 1 november and later. By duration vegeteriansi period of culture following allocate: keyruk (235 days) — teresken (240 days)- izen (243–255 days) — chogon (250 days) — qomforosma (255–265 days)- polin (255–265 days).

Survival cohort. In 6 years of life according to its survival allocate in following sequence: izen (80,1–85,3%), keyruk (75,3–78,2%), teresken (72–73%), polin (40–60%), chogon (45,3%), qomforos (36,4%). Rootage system. Study about rootage system separate in arid stern plants (in different zone) engage a lot of research people Amelin, Blagoveshenskiy, Petrov, Nechayeva, Shalit, Shamsutdinov and Rabbimov [3]. In condition of culture in submontane semidesert Nurota rootage system arid; stern plants in 5 year of life passage in different deep of chogon- 450 sm, keyruk- 325 sm, izen-325 sm, polin- 250–300 sm, teresken- 250 sm. [4]. Horizontal distribution rootage according to its culture is found limit 150–200 sm in diameter.

**Altitude plants.** In average in 6 year of studying broadside of high (77–89) has izen, choga and polin. Keyruk already in his life achieve his more high average high 6 years level in this sign. Rest types of plant in his first year lower of average 6years level 24 sm (polini), 21sm (teresken), chogon, izen [5]. Productivity of stern and family. In average 6 years study of crop yield deserts stern of plant form 3,9–23,5 dry mass of stern. More crop field has izen (11,2–23,5), keyruk (18,9–20,3), and chogon (16,4) [6]. The copy field family’s culture in average in 6 years study include 0,7–5,8. The highest crop field has keyruk (5,3–5,8), izen (3,7–3,9).

#### Conclusion

1. In condition in submontane in semideserts Nurata region of Samarkand Uzbekistan dupe 6 years comparative complex study about 6 types of available deserts plant from chenopodiavious and acid subdumi and the life of subdumi.

2. In duration vegetarian period of culture sequence in following system: keyruk (235 days), teresken (240 days), izen (243–255days), chogon (250 days), qamforosaj (255–265), polin (255–265 days).

3. In condition of culture in the 5 year of life roofage system of studying types of pass in deep depth: chogon 450 sm, keyruk 325sm, izen 325sm, polin 250–300sm, teresken 250sm.

4. In high survival of plant in six years of theirs life has izen- 80–85,3%, keyruk- 75,3–78,2%, teresken- 72–73%, average of survive polin- 40–60%, chogon-45,3%, qomforosa- 36,4%.

5. In average in 6 year corp field desert stern form of plant 3,9–23,5% dry stern mass. More corp field has izen-11,2–23,5%, keyruk-18,9–20,3% and chogon 16,4%. Copy field of family for culture in average in 6 years study has izen 0,7–5,8%, and chogon 2,7–2,9%.

6. According to complex economical ayailable mark more perspective for create higher productivity of pasture agrophytoce- nosis autumn-winter period in condition submontane semideserts

Uzbekistana has subshrub — chogon and tersken and subshurbus types as izen, keyruk, polini.

In the condition of piedmont pasture in Uzbekistan was held comparative complex research in 6 types of more perspective de- serted food plants out of pigweeds family belonging to vital. Accord- ing to economically variable features more perspective for creation high productive pastoral of agro plant formation, autumn and winter usage in piedmont desert in Uzbekistan.

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## Modeling of the water-salt regime dynamics of the Aral sea and its coastal zone

**Abstract:** The digital model for calculation of the Aral Sea dynamics is proposed in the paper. It makes it possible to deter- mine the following values. The solution of the coastal zone relief digital model proved to be sufficient for detection of the gulfs separating from the sea as well as limanlike areas and marsh saline soils.

**Keywords:** Aral Sea dynamics, ecosystem transformations, salt aerosol, degradation, mathematical modeling.

The digital model for calculation of the Aral Sea dynamics is proposed in the paper. It makes it possible to determine the follow- ing values: correlation between the sea level and the water volume, as well as the aquatory area, to calculate the location of liable to seepage salinization of coastal areas and in future the salt and dust carry-over areas. The method of minimal curvature was used in the capacity of interpolation algorithm. The solution of the coastal zone relief digital model proved to be sufficient for detection of the gulfs separ- ating from the sea as well as limanlike areas and marsh saline soils.

#### Methodology of reconstruction of geomorphologic char- acteristics of the sea-bottom and coastal areas

The most reliable way of retrospective analysis of a coastal zone condition prognosis is the restoration of the postaqual land relief on the basis of the bathymetry. With that end in view we had designed and specified the digital model of the Aral Sea floor relief The meth- od of the minimal curvature was used as interpolation algorithm. Thus the adjustment to the usual planar model is carried out by the method of the least squares:

$$jAX+BY+C=Z(X, Y)$$

Then the values of planar regression are subtracted from the values of initial height marks and for interpolation of distribu- tion of these differences to the nodes of the frame the algorithm of minimal curve allowing the modified biharmonic differential equa- tion with corresponding boundary conditions is used.

The obtained digital model of the relief with a pace of 1000 m per pixel has also demanded the subsequent processing — namely Furrye- filtration for removal of the higher order harmonics. Application of the Furrye-filtration has allowed to remove excessive, being the con- sequence of interpolation mistakes, the local minima and to approach the digital model of the Aral Sea bottom relief to the real topography.

#### Calculation of dynamics of salt carry-over sources

The Aral Sea as the closed midland reservoir and an end point of water collection possesses a number of specific physic and geo- graphic features. It is in particular, the intensive water-salt exchange with adjoining coastal territory, high level of losses on evaporation and practically full dependence on the river water entry.

The simplified water-salt balance of the Aral Sea can be de- scribed as follows.

$$dW/dt = D_r + D_d + D_{hl} + S(W) \cdot F_{se}(A/W) - L(W) \cdot F_{sme}$$

For the water balance the following ratio is used:

$$dA/dt = C_r + D_r + C_d + D_d - L(W) \times A/W \times F_{smc} + S(W) \times C_{col}$$

where  $W$  — total amount of water in the sea,  $\text{km}^3$ ;  $D_r$  — a river drain (washing dumps of lakes of northern part of delta),  $\text{km}^3/\text{year}$ ;  $D_d$  — a collector-drainage drain,  $\text{km}^3/\text{year}$ ;  $D_{nl}$  — natural waters, mainly unloading water horizons of a plateau Ustyurt and deposits during the autumn-winter period,  $\text{km}^3/\text{year}$ ;  $S(W)$  the area of a water mirror,  $\text{km}^2$ ;  $F_{se}$  — losses on evaporation,  $\text{km}^3/\text{year}$ ;  $L(W)$  length of a gently sloping coastal line;  $F_{smc}$  — filtration losses along a shore,  $\text{km}^3/\text{year}$ .

Let's designate  $D = D_r + D_d$ ,  $C = (C_r D_r + C_d D_d) / D$ ,  $h$  — a sea level.  $f$  — salinity,  $i, j, k$  — the moments of time (years) for the period of drying of the sea. Then the salt balance is calculated from ratio:

$$\begin{aligned} (S(h_i) + S(h_j) C_{col} - (L(h_i) f_i + L(h_j) f_j) F_{smc}) / t_{ij} - 2 C D_j \\ (S(h_i) + S(h_j) C_{col} - (L(h_i) f_i + L(h_j) f_j) F_{smc}) / t_{jk} - 2 C D_j \end{aligned} = 2 (f_j W(h_j) - f_i W(h_i)) / t_{ij} - 2 C D_j$$

from which

$$F = [((f_j W(h_j) - f_i W(h_i)) / t_{ij} - C D_j) (S(h_i) - S(h_j)) - ((f_k W(h_k) - f_j W(h_j)) / t_{jk} - C D_j) (S(h_j) - S(h_k))] / [(L(h_k) f_k + L(h_j) f_j) (S(h_j) - S(h_k)) - (L(h_i) f_i + L(h_j) f_j) (S(h_i) - S(h_k))],$$

where  $A$  — total of mineral salts in Aral sea;  $C_r$  the maintenance of salts in river water;  $C_d$  — the maintenance of salts in collector-drainage drains;  $C_{col}$  — intensity of wind carrying out of salts from seaside saline soils.

Time dependence of a level, volume, salinity and the water area of the Aral Sea on the river run off is an object of research and regular monitoring. We obtain the dimension value of  $F_j$  describing the salts transport from the ground waters to a day time surface of the flat beaches, equal to 3800 tons yearly per kilometer of a coastal line. It coincides with the natural data (up to 150 tons/hectare), that confirms the opportunity of relief digital models usage as the basis for modeling no equilibrium water ecosystems.

#### Verification of the model by the remote probing data

As a result of dispersion and absorption of sunlight emission the mineral dust can play a significant role in the climatic changes, influencing the radioactive balance. Besides, salt and dust streams can influence the climate indirectly, changing the nucleation and optical characteristics in the clouds. The dust can serve as a reactionary surface, a kind of sorbent for gaseous impurity substances in the atmosphere, as well as the catalyst of photochemical reactions (Kostyuchenko, 1984). Within the bounds of the project TOMS (a spectrometer for the full mapping of ozone) the data on dispersion in the atmosphere in the ultra-violet area, caused by the aerosol presence (Ackerman, 1979; Arimoto, 2001) has been collected. Though the given technique of optical estimation of aerosol concentration in the atmosphere from the orbital device did not enable to define their chemical composition, nevertheless the source of aerosols of global value were revealed. One of such regions is the Central Asia. Two main sources of aerosol carry-over — of the Caspian and the Aral seas coasts were revealed here; in addition, in the Caspian region practically all emission took place in partly desiccated Kara-Bogaz-gol. In the Aral Sea region these sources are concentrated on the Southern and Southeastern coasts.

Short-wave and long-wave IR-channels of the satellite NOAA were used at interpretation of spaces pictures, as well as calculated vegetative index

$$NDVI = (I_{ir} - I_{red}) / (I_{red} + I_{ir})$$

Here  $I_{ir}$  is the intensity of the near infra-red channel,

$I_{red}$  is the intensity of the red channel.

The zone of former islands and the East coast as a whole are characterized by very low projective coverings, including ephemeres which testifies the salinity of this massif of soil.

#### Use of the space survey data for specification of geomorphologic structure of the sea bottom

The effective means of the initial geomorphology determination of the desiccated bottom can be the retrospective data of remote probing of 90–2000-ies, by which it is possible to easily restore the distribution of depths in the coastal strip of the reservoir. For this purpose we used the spaces pictures received from satellites NOAA, Resource, Landsat and MODIS.

The remote probing data is the effective means of dynamics parameter correction of the aquatory area and the coastal line position calculated by the bathymetry.

The pictures of NOAA, despite of their insufficient spatial resolution (1 kilometer per pixel), allow to estimate the depths distribution practically on all the water area of the Aral Sea, except the deepest water sites of the Western part. At the same time the set of MODIS pictures enables to average distribution of phototone with the purpose of exception of undesirable influence of meteorological factors and aerosol streams.

As the initial data set on the regression, subject to specification, the 1:100,000 scale bathymetrical map of Aral Sea digitized and transferred in a uniform projection with the space pictures was chosen. For elimination of structure characteristics of the back surface, not described by generalized isobaths of the given map, the spatial averaging of the image intensity in the direction of a descending bottom and the spline — interpolation was carried out. Then according to the depths marks and the intensity set the variogramme was built which minimized a geospatial mistakes.

The heterogeneity revealed by us in dependence depth — intensity can be explained, first of all, by non-uniform distribution of a phytoplankton, constant presence of a dust haze and also a natural background noise of the touch device. The digital relief model of a newly drained bottom received on a variogramme, giving enough information for revealing of salt accumulation sites, is a starting point for the subsequent existential analysis of a postaqual land condition dynamics Alternative method of bathymetry restoration according to remote probe of a shallow coastal zone is use of Markovian field model with the latent parameters. In this variant natural correlations between true depth and optical density of the image are allocated on a background of steady fluctuations of water thickness optical parameters and a bottom, the silt weights caused by moving in a strip of a surf which intensity directly depends on characteristics of a ground surface, its structure and morphology:

$$D_{ijt} = f(C_{ijt} \cdot F_{ij} \cdot M(F_{ijt}) \cdot h_{ij}^2)$$

where:  $i, j$  — coordinates of a raster point on a picture from space;

$t$  — time of a space survey;

$D_{ijt}$  — density of image phototone;

$h_{ij}$  — depth;

$F_{ijt}$  — a turbidity of water;

$C_{ijt}$  — optical density of a sea-bottom surface;

$M$  — median average on nearby points of settlement area, the size of averaging area is determined by depth  $h_{ij}$ ;

$f$  — the empirical function close to linear.

As the one-seasonal set of pictures from spaces of the average resolution is used, it is possible to neglect washing out of a bottom under influence of coastal currents. From obvious preconditions smaller time dependence of optical density in comparison with a turbidity of water is postulated:

$$(\tau | F_{ijt+1} - F_{ijt} | / \tau_t) \ll (| C_{ijt+1} - C_{ijt} | / \tau_t)$$

where — the settlement period (one year);  $\tau_t$  — the period of time between the moments of data remote probe acquisition.

The resolution of coastal strip relief digital model appears sufficient for revealing gulfs separated from the sea, like estuary sites

and marsh saline soils. Use of coastal strip digital model enables to estimate volumes of a salt storage on postaqual land and spatial distribution of water-soluble salts deposits (Statov et.al., 2004). Results of model verification with the data of remote probe and KazNIGMI's data are given below in graphic performance Comparison of designed Aral Sea water area with use of geomorphologic model with the remote probing data (satellites MODIS and AQUA) specify high quality of model. Also the comparison design volume of the sea with calculation by standard KazNIGMI methodology was carried out. It

was established, that insignificant differences of the geomorphologic model created on the basis of barely bathymetrical data, are completely removed by correction according to remote probing data.

The geomorphologic model of the Aral Sea developed by us made it possible not only to determine the coastal line position, the area and volume based on the data about the sea level but also to estimate the location of constricted marsh saline soils, low flat beaches, negative forms of a relief and other potential sources of chloride and sulphatic aerosols emission.

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## Section 4. Geology

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### New data on the phylogenetic development of the Permian *Ichtyolaria*

**Abstract:** The article deals with problems of the genus *Ichtyolaria*, which is one of the most important and numerous in the Permian system. This genus has a significant stratigraphic significance. The predominant number of species is presented by characteristic or principal species. The phylogeny of the genus *Ichtyolaria* is studied for the first time on the basis of representative material collected by the author. The study reveals the complex mechanism of speciation, which is influenced by a significant number of factors: paleo-ecological crisis, induced mutations, changes in the genotype, a significant exchange of genes. Much attention is paid to the habitat.

**Keywords:** Phylogenesis, foraminifera, Permian system, age, branch, tree, population, shell, stratotype, complex, species, genus, the Ufimian, century.

#### Introduction

Synonymics of the genus *Ichtyolaria* [1] is controversial for more than eighty years. At different times under this generic name micropaleontologists described representatives of the following genera: *Spandelina* [2, 3–9]; *Frondiculinita* [10]; *Frondicularia* [11] and etc. The main reason for unclear systematic position is that the author of the species *R. Wedekind* [12] gave practically no description and did not substantiate the detection of the genus.

The genus *Frondicularia* was redescribed as *Ichtyolaria* by Sivrye and Desovazhi in 1965. But the diagnosis almost duplicated the description of the genera *Spandelina* and *Frondicularia*. Later, the validity of the genus *Ichtyolaria* was presented in the work of A. V. Fursenko [13]. However, up to the present time the question concerning the essence of the genera *Spandelina*, *Frondicularia* and *Ichtyolaria* remains open.

Among micropaleontologists, who deal with the study of late Paleozoic foraminifera, there are three points of view:

1. Some believe that the name of the genus *Spandelina* is identical to the genus *Ichtyolaria* [1] and by the right of priority, preference should be given to the genus *Spandelina*, because it was detected earlier.

2. A. A. Gerke classified in his numerous works all species, which were described by K. V. Miklukho-Maklay as the genus *Spandelina*, to the genus *Frondicularia*.

3. V. M. Igonin [14] thought that shells of spindle-like shape with a compressed shell, calcite wall and little embracing loculi should be attributed to the genus *Ichtyolaria*.

4. Foreign researchers think that the genus *Frondicularia* consists of two and maybe more genera. For example, the Australian specialist V. Palmieri [15] isolated new genus *Howchinella* from the genus *Frondicularia*, within the framework of which he described four species. Some old species, that were regarded by V. Khovchin, I. Krespin as the genus *Frondicularia*, were attributed by him to the representatives of the genus *Howchinella*. However, he also singles out the genus *Ichtyolaria*.

In our opinion, it is most precise to name the genus *Frondicularia* as *Ichtyolaria* due to the fact that it was described in detail by Sivrye and Desovazhi. One should not exclude the possibility that *Ichtyolaria* covers several genera, but such a claim requires more substantial arguments, for example, extensive use of electronic microscope for study of internal and external morphology of a shell: aperture, septa, pre-sutural thickening; the latest methods should be applied for ultrastructural study of the shell walls [16–19].

#### Results. Phylogeny of Permian *Ichtyolaria*

From calcareous Permian foraminifera, along with the genus *Nodosaria* [20, 21], *Ichtyolaria* should be regarded as the most polytypic genus, which numbers more than fifty species, and which originated apparently from the genus *Perunia* [22]. During Permian age the genus *Ichtyolaria* underwent the prosperity. Evolution of the genus *Ichtyolaria* can be seen on the example of phylogenetic tree, where there are all three classes: leaves, nodes and root. *Ichtyolaria prima* (Gerke) should be referred to as the most ancient species, standing at the base of the root, which appeared in the early Saraninsky age, had considerable self-regulation, created a sustainable biocoenosis and had a life area within all basin of Bjarmaland [23; 24]. Shell is small, leaf-shaped, with thin septa, one- and two-layer shell. With clear characteristics of sustainability of generic features.

Until the middle of Saraninsky age, there was a stable biogeocoenosis (climatic), after which evolutionary development took place: the rooted trunk was divided into two large branches A and B, which later continued to evolve on their own until the Ufimian age. To the first branch A we should attribute forms, which inherited from their ancestor a small shell, not sunken thin septa, some extension in the middle part, often a developed aperture. To the second branch B we should attribute larger species, which had from the ancestor the callosity in the second half of a shell; low septa; extension of the ultimate loculus with a significant deepening of seams. Both branches evolved in the direction of increase of shells, extending the number of loculi, complication of apertural apparatus, thickening of walls, as well as a more complex joining of septa with the inner surface of shells [23; 25; 26].

At the baseline of the branch A there is an ancestral form *Ichtyolaria amygdaleformis* (Gerke, (principal species of middle Saraninsky age), which has small loculi and a quite elongate aperture. It constituted a large population, which was spread in normal salty environments and existed until the Ufimian age because of universality of genomes and their ability to adapt to changing conditions. The species is especially widespread in Pechora province and in Taymyr-Kolyma sub-region. Conditions for existence of the species in Sarginsky age were very favorable. At the same time, within the population there were forms with significant changes of genotype (expansion of shell, considerable elongation of ultimate loculus), what led to the formation of phenotype. For example, at a later development stage the complication of aperture occurred in many specimens. This feature is dominant and manifested in the whole phylogenesis. Since the middle Saraninsky age there was a strong modification variability, which was adaptive to the changing living conditions, what further led to the formation of new species.

*Icht. extera* (Zolot.) appeared in the early Filippovsky age. It was similar to the ancestral species due to the structure of aperture and cassideous ultimate loculus. The species *Icht. extera* (Zolot.) is principal for Filippovsky age. A significant population is observed in the East-European water area (the species is rare in Taymyr-Kolyma sub-region). On the boundary of Saraninsky and Filippovsky ages there was a significant shallowing of the Eastern-European sea. There were intense induced mutations, associated directly with the change of ecosystem, what in turn led to the emergence of new species. There was another important evolutionary transformation: two species emerged from the node of *Ichtyolaria extera* (Zolot.): *Icht. soloduchowi* Suchov, which was principal for Filippovsky age, and *Icht. caseyi* (Crespin), which was previously found in Notalnaya area. Allopatric speciation played an important role, which increased during Irensky and Solikamsky ages due to the greatest isolation of basins.

During early Irensky age the branch *Icht. soloduchowi* Suchov gave a rise to 2 species — *Icht. mica* (Gerke), which existed until Solikamsky age (the species inherited from the ancestor a similar shell, low structure of the aperture), and also *Icht. reliqua* (Gerke) (from the ancestral form it inherited ultimate loculus, not sunken seams, thin septa). The species *Icht. soloduchowi* Suchov is very numerous in the stratotype, — huge populations emerged in water areas, in which new species developed, which are very similar to the original species, what is typical for sympatric speciation. The species *Icht. reliqua* (Gerke) was formed as a result of epigenetic imprinting (change of the phenotype). This species also existed until the first half of Solikamsky age, when it along with many other species became extinct as a result of environmental changes.

The species *Icht. mica* (Gerke) was quite numerous, and during late Irensky age it created a huge population of related forms. As a result of shallowing of the basin, a persistent transformation of the genotype (mutation) occurred; new species dedifferentiated from the node during Solikamsky age, including: *Icht. sectorialis* (Voron.), *Icht. propria* (Voron.), *Icht. pseudotriangularis* (Gerke), *Icht. abies* (Schleif.). These types can be designated as leaves of the rooted tree.

During early Solikamsky age a whole set of new species differentiated from the node *Ichtyolaria reliqua* (Gerke), which considerably inherited from the ancestor the shape of a shell aperture, among which are *Icht. bephana* Suchov, *Icht. vesta* Suchov, *Icht. dilemma* (Gerke) (including different varieties), *Icht. longissima* (K. M.-Macl.), *Icht. valeevae* Igon., *Icht. acutanacula* Igon., *Icht. petschorica* Suchov, *Icht. bajcirica* (Zolot.). The species are similar to each other and inherit from ancestral forms in a different degree a spear-shaped shell, high thin septa, ultimate loculus, apertures, shape of initial loculus, what serves as proof that there is a polyphyletic group at this level.

Some principal species of early Solikamsky age, such as *Ichtyolaria valeevae* Igon., *Icht. acutanacula* Igon., existed until late Solikamsky age, in which foraminifera were not diverse and numerous. In fact, the complex of late Solikamsky age represents a depleted population of early Solikamsky age, what is associated with a significant reduction of sea area and with deterioration of living conditions. In the complex there are different species of some taxa, for example, *Icht. dilemma* (Gerke)). However, there are some new species that were able to adapt to changing conditions, including *Icht. zavodovskyi* (A. M.-Macl.) (typical for Kazanian age), which derived from *Icht. valeevae* Igon. and had a common shell shape and aperture structure.

During late Solikamsky age there was a decline of the taxonomic group, characterized by a decrease in the number of specimens, narrowing of habitat and reduction in species numbers. Among small populations there was a constant transfer of gene flow, which reduced genetic differences between them, and which also significantly affected the speciation. During late Solikamsky age a significant number of species became extinct, which were unable to pass through a paleoecological crisis, among which there were *Ichtyolaria acutanacula* Igon., *Icht. dilemma* (Gerke), *Icht. fallax* (Gerke).

Branch B starts from the species *Ichtyolaria inflata* (Gerke), which emerged in middle Saraninsky age, which was very favorable for progressive development of taxonomic group (broad water areas, warm climate). The population belongs to another adaptive zone, which is characterized by large species, what serves as an evidence of arogenesis. Numerous foraminiferal complexes faced an enhanced diversification, and the late Saraninsky age was characterized by the following evolutionary transformations: two branches branched off the nodes of *Ichtyolaria inflata* (Gerke): the first branch B<sup>1</sup> with the species *Ichtyolaria hemiinflata* (Gerke), which existed until late Kungurian age, and the second branch B<sup>2</sup> with the species *Ichtyolaria carinatostata* (Gerke), which became extinct in the early Ufimian age.

The branch B<sup>1</sup>: the species *Ichtyolaria hemiinflata* (Gerke) resembles the ancestral form due to the shell structure (it is more narrow in the first half of ontogenesis; very similar to some initial loculi). All this demonstrates evolutionary change in the initial stage of speciation (archallaxis), what just emphasizes the relationship with *Ichtyolaria inflata* (Gerke). The species also inherited from the ancestor a three-layer structure of the wall, as well as the manner of joining of septa, which are marked by a considerable thickening.

In the early Filippovsky age, the species *Icht. bojana* Suchov differentiated from *Icht. hemiinflata* (Gerke), which was principal for that geo-chronological level. The species differs from the ancestor by a higher ultimate loculus and also by a long apertural elevation with elongate apertural tube. Formation of this species was connected with sympatric speciation, when during Filippovsky age there were considerable changes of the paleoecological environment. In the early Filippovsky age the Artinskian complex (with a low apertural elevation) was replaced with another one — with a long aperture and high elevation. In the early Irensky age *Icht. kruga* Suchov, which existed until the beginning of the Ufimian age, branched off *Icht. hemiinflata* (Gerke). From the ancestral forms it inherited low loculi and low aperture with a small apertural elevation (the species is principal for Irensky age). Obviously, the reason for their extinction was a selective elimination — the species could not withstand competition with the most highly organized forms under the changed paleoecological conditions (shallowing and salinization of the basin, aridization of the climate).

The Ufimian complex of Ikhtiolaria, which has many specialized species (only some of them survived until the late Solikamsky age),

differs significantly from Kungurian complex. However, paleobio-coenosis of Ikhtiolaria of early Solikamsky age undoubtedly has a high taxonomic diversity, is located in adaptive area and has dozens of new species, what serves as an evidence of biological progress. Moreover, the morpho-physiological component is dominant (for many species, adaptation occurs within one regional paleo-basin). The most typical species are *Icht. belboga* Suchov, *Icht. daniilowi* Suchov, *Icht. ra* Suchov, *Icht. trojana* Suchov.

In early Kungurian age *Icht. planilata* (Gerke) differentiated from *Icht. hemiinflata* (Gerke), which existed until the end of early Solikamsky age and which had the thickened loculus as well as other representatives of this branch.

In the course of phylogenetic development there was an exchange of genes between populations of the branches A and B, which existed in parallel, what allows us to speak about a common gene pool of the genus. For example, in the beginning of the Ufimian age the species *Icht. daniilowi* Suchov emerged, which was much similar to *Icht. reliqua* (Gerke) (branch A) (because of ray structure of the aperture, low loculi), and the species *Icht. planilata* (Gerke) (because of a large number of loculi, a broader structure of the shell). And in early Solikamsky age, the exchange of genes only increased due to reduction of water areas. Polyphyletism played a big role in Solikamsky age.

In early Solikamsky age the populations of Ikhtiolaria evolved at a lower pace than the external environment, what led to the biological regression. The water areas significantly reduced, the total number of species decreased, the complexes became taxonomically impoverished. The complex of Ikhtiolaria seemed oppressed. Since lower Solikamsky age the population underwent mutations, which lead to morphological regression and then to the extinction of species. A significant number of species, which existed until the late Solikamsky age, became extinct, including *Icht. planilata* Gerke, *Icht. Icht. plana* (Gerke), *Icht. miranda* (Gerke).

The branch B<sup>2</sup>, at the baseline of which there is *Icht. carinatostata* (Gerke) (beginning of Saraninsky age), underwent considerable morpho-physiological changes (aromorphoses), which significantly determine arogenesis: longitudinal undulate formations on the shell surface (sculpture) appeared in all group of Ikhtiolaria. The

sculpture survived throughout the whole historical and geological development of the branch. The external transformation is associated primarily with a change in the paleo-ecological environment.

At the beginning of Saraninsky age *Icht. bella* (Gerke) separated from *Icht. carinatostata* (Gerke) (the species survived until the end of Irensky age), whose shell resembled the ancestor's shell; besides, the structure of loculi was a dominant factor. At the beginning of Filippovsky age *Icht. costiferella* (Gerke) differentiated from the species *Icht. carinatostata* (Gerke) (it inherited from the ancestral species the shape of ultimate loculus, as well as the aperture), which existed until the beginning of the Solikamsky age. Both species have undulated relief, typical for the branch B<sup>2</sup>. On the boundary of Irensky and Solikamsky ages *Icht. petschorica* Suchov differentiated from the branch *Icht. carinatostata* (Gerke), which had in common with the ancestor an ultimate loculus and ray aperture with elevation.

On the boundary of Kungurian and Ufimian ages there was active exchange of genes in two genetically close populations B<sup>1</sup> and B<sup>2</sup>, what led to the formation of modified population with common characteristics, resistant to abiotic factors. Active speciation occurred within the population. Typical representatives of mutational possibilities in the population are such species as *Icht. Ibrigita* Suchov and *Icht. subtilistriata* (Gerke). For example, *Icht. brigita* Suchov with a large number of loculi, inherited from *Icht. hemiinflata* (Gerke) (branch B<sup>1</sup>), and a pronounced undulated relief, inherited from *Ichtyolaria carinatostata* (Gerke) (branch B<sup>2</sup>).

At the turn of early and late Solikamsky ages due to the shallowing of water areas and the deterioration of paleo-climate, and as a result of narrowing of populations' habitat, the complex of *Ikhtiolaria* experienced a general adaptive syndrome, in which most species could not adapt to the changed conditions [23; 24]. Then degeneration process occurred (shells reduced in size, acquired ugly features, their internal structure simplified), what further led to the biological regression. The latest species of ribbed *Ikhtiolaria* were discovered in the beginning of early Solikamsky age.

It should be noted that the species with relief on the shell surface, likely, represent a new species, according to morphological criteria and internal structure of loculi.

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## New data on the phylogenetic development of the genus *Nodosaria* in the Pre-Ural period (Permian) in the Eastern-European sub-region

**Abstract:** Phylogenetic research of small foraminifera is an important aspect of their study. It allows to represent in a more comprehensive manner the picture of their development during geological time; to track changes of species and to understand the role of foraminifera in a geological history of the Earth; it allows to define the stability of morphological modifications, to identify genetic relationships of genera and other taxa, to find out the course of development of the studied group of fauna. Phylogeny has a great importance in solving the issues of detailed biostratigraphy. The knowledge of its laws allows us to define phylozones, i. e. the layers, where there are taxa, which characterize the segment of the specific phylogenetic line. The order Nodosariida is most interesting from the viewpoint of studying the systematization of foraminifera as the general course of phylogenesis. Its species are ancestral forms of many genera of the calcareous foraminifera, including such important forms for stratigraphy as *Lingulonodosaria*, *Dentalina*, *Pseudonodosaria*, *Protonodosaria*. It is assumed that the first *Nodosariidae* appeared as early as in the Ordovician period, however, they are known for certain only since the middle Devonian period. The family *Nodosariidae* developed by change of the morphology of a shell, its sculpture as well as by complication of the internal structure — appearance of multi-layered walls, thickened septal walls, complication of the apertural apparatus. The wall of *Nodosariidae* is secretory, calcareous, fine-pored, vitreous, radial fibrous, one-layered or complex multi-layered. Each of the listed properties is very important for systematization of the order.

**Keywords:** phylogeny, species, genus, genetic relationship, population, characteristics, *Nodosariidae*, shell, branch, aperture, wall, Foraminifera.

**Results.** The genus *Nodosaria* is most interesting for phylogenetic study, which was common during the Upper Paleozoic and Mesozoic eras, and which originated numerous genera [1]. Phylogeny of the genus *Nodosaria* can be traced in detail in the Permian Pechora sections, which are distinguished from other provinces of the Eastern-European sub-region through more representative Permian deposits. Significant formation of species *Nodosaria* took place in Permian period, in Artinskian age. The basin of Artinskian age in the Pechora Cisurals was represented by a relatively narrow meridional intracontinental sea (in fact — by lagoon) [2]. In gen-

eral, its fauna was presented predominantly by *Nodosaria* and *Ichtyolaria*. The most ancient species in Pechora province is *Nodosaria shikanica* Lip. (It is found in Carbonic period and passes to Artinskian age). In the early Irginsky age, the population of the species *Nodosaria shikanica* Lip., which had a vast habitat, underwent significant changes, connected with dwelling in different environments, in which the divergence of characteristics and the formation of new variations, subspecies and species took place: in some species — shells with high loculi developed, in other species — a slight curve in the middle part of a shell appeared. Approximately



during the middle Irginsky age the populations emerged, within each of which there was a similar set of genetic characteristics. Two evolutionary **branches A** and **B** come from the common trunk of a rooted phylogenetic tree.

In the first of these populations **the branch A** has a straight shell, which is genetically closely connected with *Nodosaria longissima* Sul. [3]; in the second population **the branch B** has shells of a slightly curved shape and relates to the species *Nodosaria bradyi* (Spand.) and *N. gusevi* Suchov [4]. The newly formed populations adapt biologically to external conditions during evolution. In the first and second cases, *Nodosaria* developed by increasing the size of forms and expanding the number of loculi. In general, the populations experienced a high biological progress during Irginsky age.

*Nodosaria longissima* Sul., *N. gigantea* Sossip are meant to be the most ancient types **in the branch A** in Artinskian water area of Pechora province. These species are very similar in external morphology, and there is a distinct genetic relationship between them (almost the same wall structure, shallow seams, low apertural elevation, simple aperture, small curve of septum [5]). Among them *Nodosaria longissima* Sul. experiences the greatest biological progress. As a result of ecological speciation, connected with the divergence of groups of specimens in the population, *Nodosaria gavrilovi* Sossip separated from *Nodosaria longissima* Sul. in Sarginsky age. And also the species *Nodosaria gigantea* Sossip branched off *Nodosaria longissima* Sul at the same as a result of microevolution.

In Kungurian age *Nodosaria angusta* Suchov, a principal form of Saraninsky horizon, branched off *Nodosaria gavrilovi* Sossip. In this stratigraphic unit the population of foraminifera is characterized by the allopatric speciation, which is associated with shallowing of the basin and emergence of geographical barriers. Geographically isolated populations appear, to which the species *Nodosaria flexa* Suchov should be attributed, which has a very close genetic relationship with the species *Nodosaria angusta* Suchov.

In Filippovsky age small foraminifera underwent evolutionary transformations: the number of subspecies and species increased, highly specialized forms appeared, for example *Nodosaria cassiaformis* Igonin, *N. clavatoidea* Rauser et Scherb. The species-specific genetic changes were associated in the first place with reliction. The sea was transformed into a shallow basin, and carbonates were accumulated in its water. The sea basin was well heated, what definitely contributed to further development of the entire benthonic fauna: there was a sufficient quantity of oxygen, sunlight, what also led to further differentiation of paleobiocoenosis. The size of small foraminifera significantly increases. At this time under influence of the external environment the mutagenesis processes gain in strength, what results in a significant, sustainable transformation of the genotype and leads to the formation of new species. One of such species is *Nodosaria pygioidea* Zol. et Igon., which branched off *Nodosaria flexa* Suchov and is regarded as a leading form of Filippovsky horizon [6, 7]. The organism continues to become more complex: two — and three-layer walls with additional sculptural elements emerge; with a huge amount of pores in the pre-apertural part; the pores form large clusters at the junction of loculi [8]. The affinity of gene pools is evidenced by convex loculi, elongate aperture, as well as the structure of pores (2–3 large pores are observed, around which there are smaller pores). *Nodosaria monile* Voron. originates from *Nodosaria pygioidea* Zol. et Igon, which is widespread in Irensky horizon (It reaches Solikamsky horizon).

The population wave is observed during Artinskian and Kungurian ages. The elevation in populations of foraminifera falls on Irginsky and Filippovsky horizons. *Nodosaria noinskyi* Tscherd branched

off *Nodosaria monile* Voron. (It survived until the lower Kazanian period). *Nodosaria unica* Suchov branched off *Nodosaria noinskyi*, which was typical for Solikamsky horizon (Ufimian stage). The latter two forms differ from other forms through a large number of loculi, elongated shell, cassideous aperture, what indicates their genetic relationship. Reliction in Pechora water area increases during Solikamsky age, what leads to a further isolation of populations. Biological regression can be traced in populations; oppressed specimens are observed.

**In the branch B** — Autochthonous species *Nodosaria gusevi* Suchov, which is typical for Artinskian stage, is considered to be the most ancient form of Nodosariida in Pechora province. *Nodosaria fasticulata* Suchov branched off it in the Early Kungurian age (Saraninsky stage), which is curved in the same way as *Nodosaria gusevi* Suchov. Species with curved and straight shells dwell in the same ecological niche and constitute a common population. Cross breeding often occurred between them. New organisms had characteristics of the species with a curved shell (the shell was slightly inclined in later development stages; the seams between ultimate and penultimate loculi were significantly sunken), and characteristics of the species with a straight shell (compact arrangement of pores in ultimate loculi, what is more typical for straight shells; the aperture has a central position). New species emerge as a result of such hybridization. The result of cross breeding is *Nodosaria angusta* Suchov, which has the characteristics of both *Nodosaria longissima* and *Nodosaria fasticulata* Suchov. This species is quite typical for Saraninsky horizon. *Nodosaria incebrata* Gerke branched off *Nodosaria angusta*, also with a slightly curved form in the middle of a shell, typical for the boundary of Filippovsky and Irensky horizons. The species *Nodosaria incebrata* Gerke is characterized by a pronounced ecological polymorphism (what predetermines the formation of new species); the population has several types of shells: with elongate aperture, with extended ultimate loculus, with the pricked size of a shell, with considerably curved septa. It is not excluded that such change of shells is connected with seasonal polymorphism and occurs as a result of changes of the photoperiod and temperature. Filippovsky and Irensky stages are characterized by a relatively low percent of species with a curved shell. *Nodosaria curiosa* Suchov, which is typical for Solikamsky age, branched off *Nodosaria incebrata* Gerke. Their genetic relationship is evidenced by elongate ultimate loculus and a barrel-shaped structure of loculi. *Nodosaria indrica* Suchov also branched off *Nodosaria incebrata* Gerke, which had some genetic characteristics common with *Nodosaria incebrata* Gerke, including straight thickened septa, oval initial loculi. Polymorphism was also observed in the species *Nodosaria indrica* Suchov, from slightly curved shapes to shapes with average curve. This species characterizes the Early Ufimian age. The species *Nodosaria uda* Suchov branched off *Nodosaria indrica* Suchov in the Early Ufimian age. In Solikamsky age in Pechora province the species' natural habitat was divided into two isolated parts due to geographical reasons (formation of ridges), what led to the emergence of isolates. As a result of gene drifts and mutational process, the genotypes and phenotypes were accumulated, what led to the formation of two new species *Nodosaria triglava* Suchov and *Nodosaria tscherdynzewi* Suchov, which changed the ecological niche of "progenitors". The species *Nodosaria triglava*, which dwelled in shallower areas, developed by thickening of a shell. *Nodosaria tscherdynzewi* developed by shell elongation, complication of aperture (which becomes long and elongates in a tube) and increase of terminal loculus. *Nodosaria tscherdynzewi* was spread in more deep-water areas. According to essential genetic characteristics (a curved shell, elongate ultimate loculus, extended aperture, orifice-shaped aperture, thickened wall, high loculi), the species with a curved shell can be eligible for higher taxonomic unit and namely genus.

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## Section 5. Study of art

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### Culture and intercultural communication in international relations

**Abstract:** The term of “culture”, “intercultural communication” are main part of modern developing society. Through rapidly development of world, culture is going to change in our daily life. This variation can be delivered about, including growth, progress, evolution, reform, innovation, revivalism, revolution, diffusion, modernization and transformation. Hereby, modernization could be appeared as adoption of broadening era confidences and practices, such as science, industry, democracy, and the idea of progress. Intercultural communication is a form of communication that purposes to dispense information across various cultures and social groups. We can only be managed and reduced such conflict through intercultural communication. As well as, we can only interfacing with others by capably and peacefully who are separate from ourselves can our global village reside.

The article contains detailed information about the introduction to the concepts of culture, theoretical approach to the culture, communication, the role of culture in cummunication process, intercultural communication as tool of world community. The article can be considered as a useful resource for experts and researchers conducting research in this field.

**Keywords:** Culture, communication, colere, intercultural, values, beliefs, people, cross-cultural.

#### 1. Understanding of culture

The word «culture» derives from a French term, which in turn derives from the Latin «colere,» which means to tend to the earth and grow, or cultivation and nurture. At the first centuries, culture was cleared as the impact of man to the nature, the bringing into cultivation of land, in order as its replacement to get the best product. Ancient Roman orator Cisiron created “soul nutrition” concept or the term of “culture” where he used a philosophical category on the development of the spirit of the phrase belonging to agriculture. In his view, culture is a means to overcome various forms of barbarism and as the tool for the transformation of the man to the perfect citizen.

In Europe, the first time “culture”, the term used by Scotland scientist A. Ferguson. According to him, culture covers after the period of savagery and barbarism in the the development of human society.

Philosophers of the Renaissance were looking at the culture as ideally, through the formation of a universal identity, comprehensive education, to educate, to influence science and art, power able to help strengthen the state. They also have suggested civilization such as the question that certain social structure which differ from barbarism.

Culture... includes all the characteristic activities and interests of people [1, P. 3]. We all belong to this or any other culture. Culture — is a collection of human knowledge, confidence and behavior in our conveyed to future generations. Culture — is the main social factor regulating the different areas of human relationships which covers from daily communication till activities of the global economy.

Culture is the unique whole, the heart and soul, that determines how a group of people will behave [9].

There are different approaches to the term of “culture”. Culture is the characteristics and knowledge of a particular group of people, defined by everything from language, religion, cuisine, social habits, music and arts. Culture appears to have become key in

our interconnected world, which is made up of so many ethnically diverse societies, but also riddled by conflicts associated with religion, ethnicity, ethical beliefs, and, essentially, the elements which make up culture,” said De Rossi.

According to E. B. Taylor (1832– 1917), [3, P. 7] culture is only spiritual culture: knowledge, art, religion, legal and moral norms and etc. Taylor qeyd edirdi ki, mədəniyyətdə təkcə ümumbəşəri yox, həm də ayrı– ayrı xalqlar üçün spesifik olan dəyərlər də vardır. Taylor noted that culture is not only cover the universal values, but also the values that are specific to individual nations.

Rikkert offers that culture to be seem as a source of values. He lists the following values: truth, beauty, divine holiness, spirituality, happiness, special holiness. Values creates the special world and a special kind of activity that seems some aspects of how the man understand the world spiritually.

Vindelband noted that culture is the values world or the world where to feel your responsibility depending on the understanding of the world by the human. Values are in consciousness, their embodiment in the reality means the creation of any kind of welfare.

According to Shpengler, history is replacement of different closed cultures to each other. In this case, the existence of a single historical process is excluded. All culture devide the age periods: childhood. adolescence, youth and old age periods.

“In general, culture is beliefs, values, customs and traditions, tastes, in short meaning, everything was created by man-made!” (A. K. Kohen).

Culture consists of the derivatives of experiences, more or less organized, learned or created by the individulas of a population, including those images or encodements and their interpretations (meanings) transmitted from past generations, from contemporaries, or formed by individuals themselves [4, P. 17].

But, in fact, what is culture? We have to agree with the idea of the numerous researchers that culture is a purely social event, whether it is related to the activities of human life.

Culture preserves and transmits knowledges. Culture creates values and symbols. Culture focus to development and strengthening the social relations. Culture creates new requirements. Culture is investing to the economy. Culture helps cities. Culture is magical world of human. It is a method of self-knowledge and personal presence [8].

Culture has extension meaning and it is complex whole including knowledge, belief, art, morals, laws, customs and any other capabilities and habits created by man who is a member of society where a group of people is related to each other through persistent relations, or a large social grouping sharing the scarce geographical or virtual territory, subject to the same political authority and dominant cultural expectations [2, P. 1205–17].

Given the above mentioned, culture is complex of a set of tangible and intangible assets getting by society throughout the history, as well as the ability of creating and using of them for the progress of humanity and transmitting of them the future generation.

### 2. The role of culture in communication

Culture informs communication. Culture brings understanding to communication through a common background of shared experiences and histories. Shared experiences over hundreds or even thousands of years create culture that contributes to understanding and communication.

Although people can communicate effectively with other cultures, they should make an effort to learn the culture as well as the language of the people they communicate with. Culture extend of communication, and this is why people usually understand those of resembling background best. As the universal shrinks, cultural understanding becomes more important.

As you communicate with people from different cultures, you learn more about them and their way of life, including their values, history, and habits and the substance of their personality [5, P. 5].

All social units develop a culture. Even in two-person relationships, a culture develops over time. In friendship and romantic relationships, for example, partners develop their own history, shared experiences, language patterns, rituals, habits, and customs that give that relationship a special character — a character that differentiates it in various ways from other relationships. Examples might include special dates, places, songs, or events that come to have a unique and important symbolic meaning for two individuals.

Groups also develop cultures, composed of the collection of rules, rituals, customs, and other characteristics that give an identity to the social unit. Where a group traditionally meets, whether meetings begin on time or not, what topics are discussed, how decisions are made, and how the group socializes are all elements of what, over time, become defining and differentiating elements of its culture.

The relationship between communication and culture is a very complex and intimate one. First, cultures are created through communication; that is, communication is the means of human interaction through which cultural characteristics — whether customs, roles, rules, rituals, laws, or other patterns — are created and shared. It is not so much that individuals set out to create a culture when they interact in relationships, groups, organizations, or societies, but rather that cultures are a natural by-product of social interaction. In a sense, cultures are the “residue” of social communication.

Without communication and communication media, it would be impossible to preserve and pass along cultural characteristics from one place and time to another. One can say, therefore, that

culture is created, shaped, transmitted, and learned through communication. The reverse is also the case; that is, communication practices are largely created, shaped, and transmitted by culture.

### 3. Intercultural communication in international relations

By “intercultural communication” we mean communication between peoples of different cultures (as opposed to communication between official representatives of nations i. e., international communication) [6, P. 55].

Culture and communication have been defined and re-defined repeatedly, as they are concepts that are intimately linked with what is intrinsically human. According to the anthropological point of view, culture became consolidated with all of its ingredients when man first became visible and established interpersonal relationships with the divergent persons forming separate communities, where thus allowing for intercultural communication.

Multicultural or intercultural communication cannot be learned without intercultural understanding which is based on the knowledge of culture [7, P. 51].

Culture influences the ways in which people communicate as well as the strategies they use to communicate. The various life experiences people have based on cultural norms also expose the interpretation they have of messages conveyed by others.

Effective communication with people of different cultures is especially challenging. Cultures ensure people with ways of thinking — ways of seeing, hearing, and interpreting the world. Hereby the same words can refer to various things to people from miscellaneous cultures, when they talk the “same” language.

In such cases, an effective communication strategy begins with the understanding that the sender of the message and the receiver of the message are from different cultures and backgrounds.

Cross-cultural communication looks at how people, from differing cultural backgrounds, strive to communicate, although it is more frequently referred to as intercultural communication [10].

Through open and honest intercultural communication, people can work together to achieve goals that benefit everyone, regardless of group or culture, including the global community in the home, business, or neighborhood [5, P. 4].

Hereby, it is important to note that, intercultural communication is caused to strengthening of cultural links among people from different countries and help them to integrate to the world cultural environment.

### Conclusion

Various cultures and their ingredients, diversity in communities and populations, main aspects of each person integrating miscellaneous cultures and varied interlingua settings proceed to be unknown scenarios. Although quite a few considerable studies and research have been followed up, culture in its various representations is unique to each instant, situation, group and individual.

Thus, it is clear that culture plays a major role when the theories of international relations explain and analyze international issues and problems. Experts and people who work in this field over time realized that it is impossible to learn international relations deeply only focusing on the military, political, economic, security as important factors. Therefore, there is special attention to the role of culture in international relations, in other words to intercultural communication, important aspect of social life has been involved in a systematic study. (Dahl, S. (2004). “Intercultural Research: The Current State of Knowledge”. Middlesex University Business School Discussion Paper [11].

Research found that explanation of culture, the role of culture in communication process, how intercultural communication as a tool among world community.

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## Section 6. History and archaeology

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### Depriving of elective rights of wealthy farmers in Uzbek SSR (in 1920–30 years)

**Abstract:** The article is devoted to deprivation of Dehkan (farmers) in the total collectivization of Uzbek villages in 20–30e years of the twentieth century. This kind of repression of the Bolsheviks was disclosed on the basis of archival documents and materials. It is stated that the main factor in determining the scope and extent of disfranchisement Dehkan are the Bolsheviks and the Soviet government.

**Keywords:** Shouro (Soviet), collectivization, “kulak”, election, rights, kulak families, political, government.

Depriving of elective rights is considered to be the most general political limiting method of the Soviet Union in 20–30s of the 20<sup>th</sup> century. People, who were deprived of elective rights, were mentioned as “the non-rights to the Shouro (Soviet)”, “the deprived of right”, “the non-rights” in official documents, juridical literatures and various press materials. In the constitution of whole Russian Council, adopted on V congress, on 10 July 1918, it was pointed out that people who use hired labor in order to make profit, who live on account of income without labor (on account of the percentage of money, income made by trading enterprises, in come made by property), merchants, religious officials, former policemen and people of other classes were deprived of elective rights by the law. Rights on electing and being elected were determined in articles 92–93. Chapter 13, part 6 of the Constitution of the Uzbek Soviet Socialist Republic adopted in, 1927 [1]. And the characteristics of people who had no right elect, were given in “Instructions on elections for the Shouro” of the Central Executive Committee of Uzbek SSR, adopted on 12 December 1927. They are:

a) Farmers who use seasonal and permanent hider-labor beyond the house-keeping made on grounds of labor.

None: In this case the main mark of the housekeeping made on grounds of labor is the participation of the family members capable for labor in house-keeping and hired-labor is additional to this.

b) Farmers who own shoemaking and industry establishment and enterprises (mill, oil-press and so on) and rule them by seasonal or permanent hired labor.

c) People who rent out household machines working animals and others and make people slaves or who make people slaves by lending money or other things) [2].

On the legal basis of Soviet elections paid a great attention to derive of social origin of the population in the 1920 s. According to its, the family members of Bukhara amire and Khiva government and its amirs, the governors of governments as: leaders of remainders, foreman, head of writers, doublehead leader, jevachi, head of guards, stablemen, toksabo, beks, biy dadhah, inak, parvanachi, divanbegi, biy kushbegi, educator of princes, ogalik, the oga of door, the chief judge, kushbegi, qupobon, the chief kalon, policeman, tax

picker, udaychi, judge, head commandant of castle, doctor (hakim) treasurer, night guard, head of hundreds, commander, leader of inner castle guards, military leader, hangman, jailer, amlakdor, kulli kushbegi, tax collector, chief gater of ark, chief of horseman, head of koris, leader solider, millennial, assignment by emir, aksakals, khans and their family members, bek hujas who managed the government, ministry of water, divanbeg, the oga of door and also the family members who directed the government, policemen, and chief policemen, devoted servants of sultan’s, vassals, mirabs were fixed by sultan, the head judgements of sultan’s government, the heads of writers, aksakals of sultan’s, volostnoys, the medresse mutavallies and others were pointed to deprive the right of election [3].

Later considering the political situation in the country, some changes and comments were adds to the instructions in order to finish people who were discontent with the actions being carried on by the Soviet Government. In 1929 the number of electors, who were at the age of 18, was 86, 98). 8772 of them were deprived of elective rights. It’s 11.2% of total voters, 471 of them were businessmen, 419 were considered to live on account of income without labor. 621 were imams and other religious officials of tsarist government and Amir [4].

At the end of 1929, collectivization of agriculture quickened in the Soviet Union. On 5 January 1930 the decree of Supreme Communist Party “on Collectivization rate and State Support for forming collective farm” was adopted [5]. During the collectivization, administrative-ordering reached to the highest point. There were very many requirements like “Set up the rights”, “abolish the list of none-right”, “re-elect for shouro”, in the demonstrations against agrarian policy and activity of the Soviets Uzbekistan, Kyrgyzstan, Tajikistan Turkmenistan [6]. It was the expression of discontent towards compulsory collectivization policy and limitation of citizenship and political rights of the Soviets. Because, “kulak policy” was a component of mass collectivization. This meant depriving people of citizenship, constitutional and elective rights [7].

Law-breaking in elections increased during mass collectivization of agriculture. During the collectivization free will inclination was broken and law-breaking, violence reached to the highest point.

Actions as limiting tax and credit policy, depriving of water carried out to country-people, who were business leaders, active in policy, against the collectivization and didn't want to lose their land and property. They were deprived of elective rights, their properties were confiscated and whole family transferring policy carried out to them.

Though the economic characteristics depriving farmers of elective right were described in the "Instructions on elections for shouro", those characteristics were more important to determine "kulak" farms in collectivization areas. In the decree of UzSSR's Peoples' Commission Councils on "Characteristics of kulak farms where the Labor Code must be used and order of registering such farms adopted on 6 April 1930 the characteristics of kulak farms were shown. But the norms of the decree carried out wrongly. Middle class farmers and poor farmers also deprived of elective right and were submitted to the list of kulaks.

People deprived of elective rights weren't only deprived of political rights but also citizenship rights. They became unemployed, they weren't admitted to the Trade Union and collective farms. They weren't given cards for goods and food products. They couldn't be appointed to any position and couldn't get higher and general special education [8].

At the result of demonstrations and rebellion of country-people in Uzbekistan, Kyrgyzstan, Tajikistan and Turkmenistan in 1930 against agrarian policy and action of Soviets the political situation became more strained. According to information of OGPU, there were slogans against forming collective farm and there were a lot of requirements as "Set up the rights", "Abolish the list of the none-right", "Re-elect for Shouro" People even committed suicide as a sign of discontent depriving unfairly of social life in public, a citizen in Tandir village, Kokand tried to knife himself as he wasn't as he wasn't admitted to the collective farm.

Central Executive Committee of Uz SSR adopted a decree "On correcting mistakes made during depriving citizens of elective rights" on 9 April 1930. At the result of control of the commission, organized at the base of the decree a lot of law-breaking situations were determined in making the "list of the none-right", and some of these lists were cancelled. But disobedience continued at some places, at the result of private enmity an intensive mechanism to abolish limiting action of citizenship and political rights wasn't made [9].

In August, 1931 "kulak families" in Uzbekistan, Kyrgyzstan, Tajikistan and Turkmenistan began to be exiled to the Ukraine, Northern Caucasus, later to Northern Kazakhstan. For example, 708 families were exiled from Kyrgyzstan: 130 from Alammiddin, 133 from Karakul, 30 from Jeti-oguz, 39 from Issiqkul, 34 from Stalin District, 72 from Chuy, 105 from Balikchi, 124 from Kalinin district [10]. And 700 families, including 3680 the young and the old, from Samarqand were exiled to Prikumsk, Northern Caucasus, Arghir, Budyonniy, Apanasenkov and the regions. Most of the "kulak" were "the none-right for shouro", and they lived tragic life [11]. The requirements on resetting up elective rights of people who were discontent with law breaking, became popular in the Union scale.

The Supreme Communist Party and Soviet Government had to discuss this matter again. According to article 135 of the Constitution of the USSR adopted on November 25, 1936 elective rights were reset up [12]. But "kulak"s, the exiled people, was not allowed to leave special regions. The young were in exception of it.

If they entered to a general-special or higher education institutions, they were allowed to leave those working regions. Within 1918–1936 the Soviet government managed to limit politically active part of people by law, who were against the collectivization policy by depriving of elective rights according to political, social and economic reasons.

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## Section 7. Materials Science

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### **Manufacturing technology carbide roller inlet box crate № 25 using refractory metal powders**

**Abstract:** The article presents the results of a study of the obtained sintered molybdenum alloy, comprising: 60–62% TiC, 20–22% Ni, 4% W, 4% Fe and the balance molybdenum Mo, for the production of roller introductory box stand № 25 and increase their longevity by selecting the optimum combination of strength and ductility. One of the main objectives of this work was the development of composition and technology of sintered powder molybdenum alloy. Beyond the basic components of TiC and Mo present in the composition administered in order to improve process performance and Ni, W, and Fe. The working part of the matrix is also used new sintered powder molybdenum alloy.

**Keywords:** refractory metal carbide, molybdenum alloy, the composition, the roller matrix, mold, a mixture powder, sintering, molybdenum, titanium, steel composition, heat treatment, strength, ductility.

Create materials based on highly dispersed powders of refractory metals refers to the key issues of the modern economy. At present, the industries the task of getting carbide tools with special mechanical, technological and physical properties on the basis of refractory metal powders.

In addressing the complex to improve performance, reliability and durability of the tool, improving the quality of products is an important development of new materials or improving physical and mechanical properties of existing.

Development and improvement of production processes [1] is inseparably associated with the use of hard alloys, which contributes to a significant increase in operational tool performance and productivity.

One of the promising ways to improve hard alloys is the development of technologies [2], which provides simultaneous improvement in properties such as toughness and wear resistance, strength and ductility compared to standard. It is the combination of these properties provides a tool life.

The desired combination of properties will have an alloy with high polydisperse component. It is expected that the major phase grains provide plasticity, and small grains — increased wear resistance of the alloy. Yield strength and hardness of the compressive strength with the increase of the fine grains in the alloy structure increases. Flexural strength is practically independent of changing the ratio of large and small grains and in a mixture of the alloy and decreases only slightly at the highest content of fine grains. Reserve plastic deformation with the increase of the proportion of fine fraction in the grain mixture of titanium carbide and 40% remains practically unchanged, while increasing to 60% is reduced slightly (10%). Analysis of the data shows that the most advantageous combination of wear resistance and ductility alloys have a ratio of coarse and fine fractions 60:40.

*Objects and methods of research.* Completed development of the composition of the system Mo-TiC-Ni-W-Fe alloy molybdenum sintered powder for the production of roller mill inlet box № 25. One of the main objectives of this work was the development of



composition and technology of the new sintered molybdenum powder composition. Beyond the basic components and TiS Mo in the composition administered to improve the technological and operational characteristics of Ni, Fe, and W:

- molybdenum (Mo) — provides flexibility, heat resistance, corrosion resistance;
- titanium (Ti) — provides the heat resistance, mechanical strength at high temperatures, corrosion resistance, and allows to provide the optimum ratio of strength and ductility;
- nickel (Ni) — was introduced into the composition to achieve the desired workability and plasticity of the powder mixture. Introduction of nickel in the alloy provides good compressibility and by sintering — the required density of the work piece, which positively affects the performance properties. Also Ni — provides toughness, mechanical strength and corrosion resistance (the parts used at high temperatures);
- iron (Fe) — is also introduced into the composition to improve processability due to reduction of oxides on the surface of titanium carbide particles and solid-solution strengthening due to the tool uptake titanium molybdenum;
- tungsten (W) — provides hardness and heat resistance, abrasion resistance, and tungsten is added in the composition for solid solution hardening molybdenum bases and to improve the hardness of the alloy.

Preliminary experiments showed that the eutectic alloys to create by sintering a powder composition comprising the same is not

possible, since the sintered alloy does not meet the requirements on any parameter. Therefore, development of an alloy — replacer was carried out, on the one hand, in the direction of increasing the content of TiC, and on the other hand, in the direction of insertion of additional refractory metal additives improving technological and operational characteristics of the alloy.

Comparative alloy assessment was conducted by two characteristics: bending strength ( $\sigma_b$ ) and Rockwell hardness (HRC). As is known, these characteristics are well correlated with characteristics such as heat resistance and hot hardness determining operability and durability of the tool during hot forming. Therefore, when developing the alloy for the evaluation criterion in determining the optimal composition were taken  $\sigma_b$  and HRC.

Optimization of the method carried out with the assistance of mathematical experiment planning. The initial starting point of an alloy containing 60% of TiC, 4% of Fe, 20% of Ni, 4% the W and the balance molybdenum Mo, who was quite an acceptable level of monitored property values ( $\sigma_b = 900$  MPa, HRC = 80) was selected in the design.

Using the method of steep ascent in the optimization of the formulation it was determined by the composition of the powder composition, which has been adopted as the basis for further research, and provides a level of strength  $\sigma_b = 1150$  MPa and HRC = 84 (Table. 1). Optimum composition of a powder composition comprising: 60-65% TiC, 20-22% Ni, 3,5% W, 3,5% Fe, and the balance molybdenum Mo.

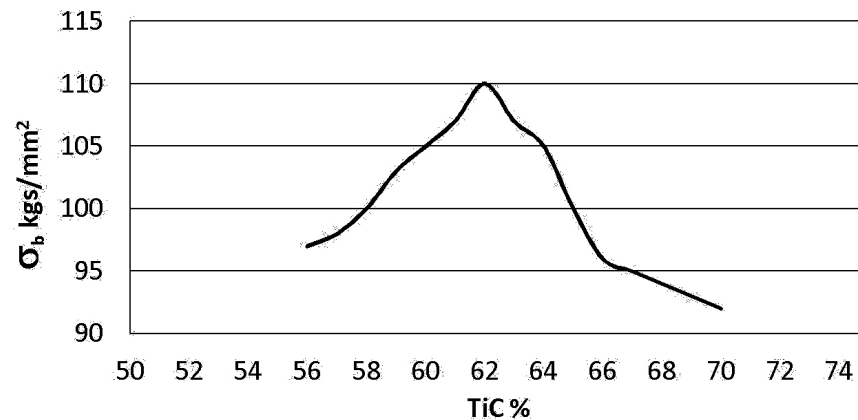


Figure 1. The dependence of the calculated values for bending strength ( $\sigma_b$ ) on the content of TiC

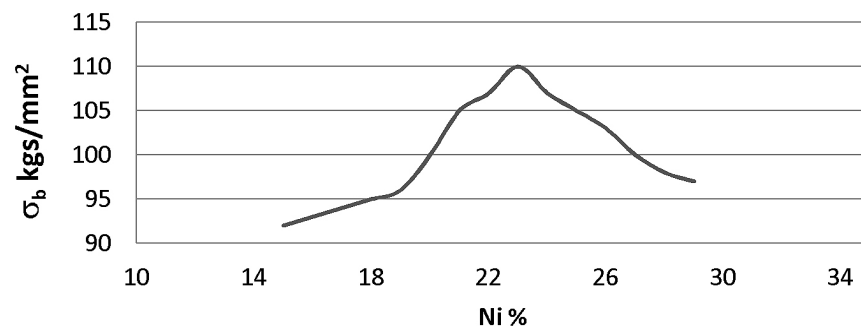


Figure 2. The dependence of the calculated values for bending strength ( $\sigma_b$ ) of the Ni content

System Technology for producing sintered molybdenum alloy Mo-TiC-Ni-W-Fe. An important role in achieving a high level of properties plays a technology of preparation of the composition and mode of its sintering. Preparation of the powder mixture was carried out in small laboratory ball mills and at a ratio of volume to volume mixture of balls with a diameter of 20–40 mm carbide VK6 1: 4. Included in the components of the composition were divided into two groups:

the first included Ni, W and Mo, the second TiC. Both groups were loaded into different components and mill mixed were ethanol in the medium for 10–12 hours. Further, the compositions were combined, and the final mixing lasted more 6–8 hours. The mixture was then placed in a distiller and the temperature was maintained at 100–120° C for 8–12 hours. The dried mixture was kneaded on 8% plasticizer rubber solution in gasoline, then held in an oven at drying temperature

100–120°C for 20–30 minutes. The finished mixture is compressed to form a pressure of 100 kgs/mm<sup>2</sup> in the press — the unit P4626. After pressing, the product is dried in a steam oven at 100–120°C temperature for 18–24 hours, and then subjected to preliminary sintering in a hydrogen atmosphere at a temperature 1000–1100°C delayed 1 hour. final sintering mode is selected depending on the purpose of the product. So, for forming tools operating at high temperatures and pressures, sintering is carried out under the regime: Wednesday - the vacuum is not lower than 3.10 mm. Hg. Article; sintering temperature 1450–1500°C delayed 1-0,5 hours; sintering time of 2–3 hours.

For the manufacture of molybdenum powder samples tests were conducted on the hardness, flexural strength and determination of their specific weights and densities. Test results showed that

the hardness of the test samples averaged 83-84 HRC; density  $\rho$  in the range 5.5–6.0 g/cm<sup>3</sup> and a flexural strength within  $\sigma_b$  105–115 kgs/m<sup>2</sup> (Table 1).

Test results showed that the hardness of the test samples averaged 84 HRC; specific gravity  $\rho$  5.5–6.0 g/cm<sup>3</sup> and a flexural strength within  $\sigma_b$  1150 MPa. Optimum composition of a powder composition comprising: 60-62% TiC, 20–22% Ni, 4% W, 4% Fe, and the balance molybdenum Mo.

Samples of molybdenum carbide tools are made in the amount of 2 pieces each under the Innovation Project OTH-economic agreements 07/08/2015 and 12/04/2013 from 41/10 and 25/10 from the city of 12.04.2012 with JSC “UzKTZhM” and tested HNVFs in number 2 of JSC “Uzmetkombinat”.

Table 1. – Plan to optimize the composition of the new sintered alloy by a steep ascent

Factors № п/п	№ experience	TiC,%	Ni,%	W%	Fe, %	$\sigma_b$ kgs/mm <sup>2</sup>
		X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	
1	Bi		+2			–
2	Bi <sub>1</sub>	+5	–	–	–	–
3	IIIar	1		–	–	–
4	№ 1	56	22	3,5	3,5	–
5	№ 2	57	22	3,5	3,5	–
6	№ 3	58	22	3,5	3,5	110
7	№ 4	59	22	3,5	3,5	–
8	№ 5	60	22	3,5	3,5	–
9	№ 6	61	22	3,5	3,5	–
10	№ 7	62	22	3,5	3,5	112
11	№ 8	63	22	3,5	3,5	–
12	№ 9	64	22	3,5	3,5	–
13	№ 10	65	22	3,5	3,5	–
14	№ 11	66	22	3,5	3,5	106
15	№ 12	67	22	3,5	3,5	–
16	№ 13	68	22	3,5	3,5	–
17	№ 14	69	22	3,5	3,5	–
18	№ 15	70	22	3,5	3,5	98

As a result of preliminary testing on the samples from the new powder sintered alloy of Mo-TiC-Ni-W-Fe tools was greater resistance compared to standard (steel rollers 8–10 times, graphite roll-

ers 6–8 times) and almost the same compared with solid VK6 alloy. Also tested molds for pressing powders, shaping tools.

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## P-T-C diagrams for Ti — C base coatings obtained by Physical Vapour Deposition methods

**Abstract:** The thermodynamic method for predicting phase and chemical composition of coatings based on titanium carbide formed by the method of ion plasma has been investigated. For experimental verification of theoretical data used the phase and chemical analysis methods.

**Keywords:** TiC hard coatings, composition of non-stoichiometric coatings, diamond-like clusters, AES, XPS, HREELS.

**Introduction.** In physical vapour deposition (PVD) processes, the coating is deposited in vacuum by condensation from a flux of neutral or ionized atoms of metals. Several PVD techniques are available for deposition of hard coatings. Among them, cathode arc vapour (plasma or arc ion plating) deposition, magnetron sputtering (or sputter ion plating), and combined magnetron and arc processes [1] are the most widely used techniques to deposit various hard coatings. These PVD processes differ with respect to the type of evaporation of the metallic components and the plasma conditions employed during the deposition process. The transition of the metallic component (to be deposited) from a solid to a vapour phase (in which metal atoms are ionized in different ways) may be performed by heating of an evaporation source (as in cathode arc) or by sputtering of a target (as in magnetron sputtering).

In paper [2] (CAD-cathode arc deposition) on a copper substrate obtained by coating a titanium carbide (TiC) stoichiometry vacuum — arc method. We have studied the adhesion of the composition and structure of TiC coatings with a thickness of 1 to 3 microns. As the reaction gas used in the synthesis of titanium carbide pair  $C_6H_6$  benzene. It is noted that the titanium carbide has a wide range of homogeneity ( $TiC_{0.48}$ – $TiC_{0.95}$ ). However, in the article a non-stoichiometric composition of titanium carbide and the effect of titanium and carbon ratio on the phase composition and properties of the coatings have not been studied. To improve adhesion of the coating to the substrate pre-coated pure titanium, followed by a subsequent change in the gas supply chamber is adjusted by the thickness ratio of the titanium and carbon.

Carbides of transition metals have high melting points, sublimation specific heats, elasticity moduli, hardness etc. These properties

are playing the decisive role for application of these compounds as wear resistant coatings on tool steels. There should be reached the optimal combination of these properties: hardness, heat expansion coefficient, elasticity modulus, heat conductivity and others.

The range of coatings properties could be significantly expanded due to high homogeneity limits for transition metals carbides with defects in carbon sublattice. So, titanium carbides of non-stoichiometric composition ( $TiC_{0.60}$ ) have high heat expansion coefficient close to one for M15 (AISI) steel, and stoichiometric carbides ( $TiC_{1.0}$ ) have high elasticity modulus, hardness and heat conductivity [3]. So the investigations and prediction of phase and chemical composition of carbide coatings built by ion plasma method is very important.

The aim of present work is prediction of phase and chemical composition of PVD coatings in dependence from technology parameters of the ion plasma process.

**Objects and methods of research.** Thermodynamic method of phase equilibria based on entropy maximum principle for isolated system [4] was used for calculations. Chemical elements concentrations in system and two thermodynamic parameters: reaction gas (acetylene) pressure  $P$  and substrate temperature  $T$  — were used as input data.

Acetylene ( $C_2H_2$ ) mass flow was determined as:

$q_{C_2H_2} = 1.27 \cdot 10^{-3} \cdot P$ ,  $kg \cdot m^{-2} \cdot s^{-1}$  [3–6]. Metal mass flow is equal  $q_{Me} = K \cdot v \cdot \gamma_{MeC_y}$ ,  $kg \cdot m^{-2} \cdot s^{-1}$ , where  $v$  is the coating deposition velocity,  $\gamma_{MeC_y}$  is density of carbide,  $K$  is the coefficient dependent from molecular mass of metals ( $K_{Ti} = 0.8$ ) [8; 9]. Thermodynamic properties of  $TiC_x$  in wide range of temperatures [10] were used for phase composition prediction.

Before the coating application the substrate was firstly polished mechanically, then degreased in a ultrasonic rinse of ethanol and finally sputter-etched with argon "in situ" (current density  $j = 50 \mu\text{A}/\text{cm}^2$ , dose  $D = 10^{17}$  ions/ $\text{cm}^2$ , accelerating voltage  $U = 30$  kV).

Chemical composition and electronic structure of coatings were investigated by AES and XPS methods on Electron spectrometer ESCALAB MK-2 (VG, UK), using electron gun LEG200, monochromated X-ray source Al  $K\alpha$  ( $h\nu=1486.6$  eV) and low energy electrons source EMU-50. The spectra of valence band had low intensity and were recorded at  $0.04$  eV/s with 24 scans. The spectrometer was adjusted using Au reference sample. The spectrometer tunings provided energy resolution better than  $0.6$  eV. HREEL spectra were recorded with the same spectrometer settings at primary beam energy  $7.0$  eV,  $50^\circ$  angle of incidence with respect to the surface normal. The nominal resolution of the spectrometer was  $17$  meV with using the graphite standard. We were

able to record spectra with  $33\text{--}35$  meV full width at half maximum (FWHM), depending on the state of the sample. HREEL spectra were recorded at  $0.002$  eV/sec, 5 scans. Typical count rates were  $2 \times 10^4$  s $^{-1}$  in the elastic channel for the PVD coatings.

The AES quantitative analysis of chemical composition was made using standard approach [7; 8].

The samples were cleaned by high purity acetone and than by Ar ions in the spectrometer preparation chamber during 20 min. at pressure about  $1 \cdot 10^{-4}$  Pa, accelerating voltage  $10$  kV, ion beam  $20 \mu\text{A}$ . Than the samples were moved to the work chamber at vacuum  $10\text{--}8$  Pa. These measures allow to avoid influence of occasional contamination.

**Results and their analysis.** The results of calculations of PVD coatings phase compositions are presented as P-T-C diagrams (Fig. 1). These results shows that acetylene pressure, temperature, and deposition velocity strongly influence on chemical and phase composition of Ti-C coatings.

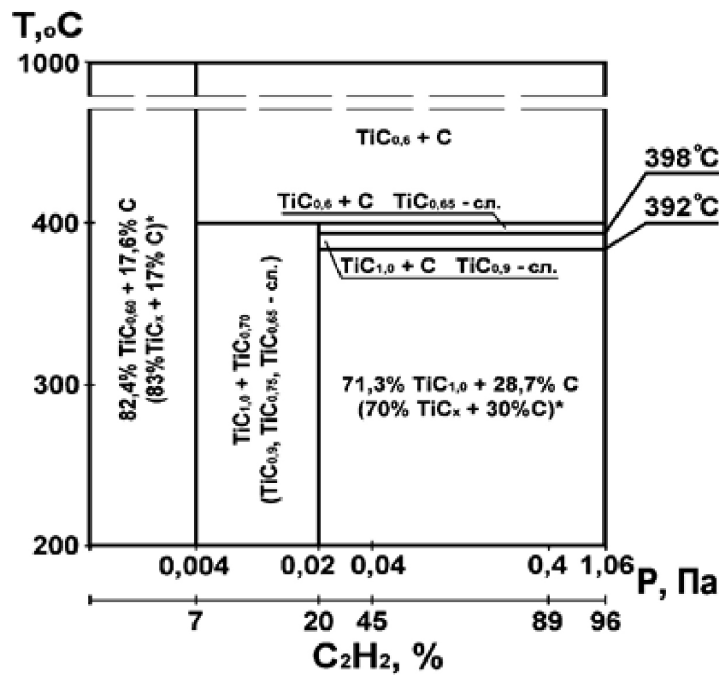


Figure 1. P-T-C diagrams with phase composition of PVD coatings on base of titanium carbides (top) \* — AES experimental data.

These coatings can contain carbides of non-stoichiometric composition and free carbon inclusions. Comparison of calculated phase composition of PVD coatings (P-T-C diagrams) with equilibrium diagrams Me-C (where Me is Ti) allows to conclude the identity of phase compositions in both cases.

The calculated phase and chemical compositions of coatings were checked experimentally.

According to quantitative Auger analysis, the composition of surface is the following. The  $\text{TiC}_x$  coating applied on the M15 high speed steel substrate at acetylene pressure  $1.1$  Pa has  $33\%$  at. TiC and  $67\%$  at. of free carbon that corresponds to  $70\%$  mass. TiC and  $30\%$  mass. C. These data are obtained from assumption on formation of TiC-type carbide and Auger data where the relations of C and Ti atomic concentrations are  $\frac{C}{Ti} = 3.05$  or  $\frac{C}{TiC} = \frac{2}{1}$ .

Figure 2 show  $1s$  core-level spectra from  $\text{TiC}_x$  PVD coatings made at various pressures of reactive gas ( $0.004$  and  $1.06$  Pa). Complex composition of coating leads to doublet due to C-C and C-Ti bonds. The position of the individual lines correspond to kinetic energies  $-1205.0$  eV and  $1201.6$  eV.

The estimated C1s core-level shifts with respect to the kinetic energy of the graphite standard ( $1202.3$  eV) were  $+1.7$  eV and  $-0.7$  eV. These shifts are similar to those reported for TiC, graphite and diamond [9; 10]. The intensity of free state carbon line increases with increasing the concentration (pressure) of reactive gas.

Figs. 3 present XPS valence band spectra of TiC PVD coating and TiC standard sample. Fig. 3 also shows the model density of states (DOS) for TiC. The electronic structure of valence band has 2 groups of levels. One group has high binding energy ( $1 a_{1g}, 1 t_{1u}, 1 e_g$ ) filled mainly by s-electrons of non-metal and partly by s- and p-electrons of metal. Other group is separated from the first by wide energy gap and has low binding energies with main input of p-electrons of non-metal and d-electrons of metal.

Free carbon in the TiC-based coating makes input in structure of valence band. To separate this input the (2) spectrum was subtracted from (1) with preliminary normalization on TiC content ( $33\%$  at.). The line 3 shows the result tied with free C: PVD coating has high DOS at  $9 \dots 14$  eV, medium one at  $15 \dots 19$  eV and low one at  $0 \dots 9$  eV. Energy state and relationship between intense peaks conforms with the theoretical DOS of diamond [9]. It is known that the

characteristic feature of the energy-band structure of diamond is the absence of  $\pi$  – lectrons. However, in the sample under examination, the low DOS is found not only in the  $\sigma$ – states region of 5 ... 8 eV, but also in the states region of 0 ... 5 eV. At present it is rather tied with a small quantity of carbyne in PVD coating [10; 11]. Thus, this study of the outer shells of atoms in the surface coating has confirmed it complex phase structure. The coating contains TiC and carbon in two states diamond–like and carbyne.

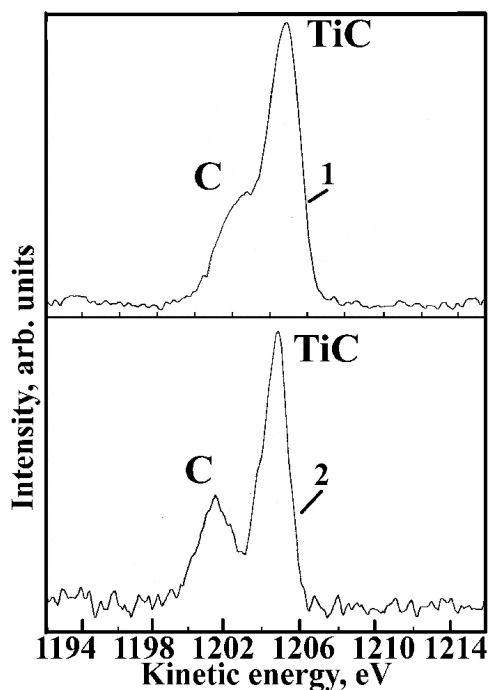


Figure 2. C1s photoelectron spectrum of PVD TiC films applied at various pressures (P) of reactive gas. 1 – P = 0.004 Pa; 2 – P = 1.06 Pa

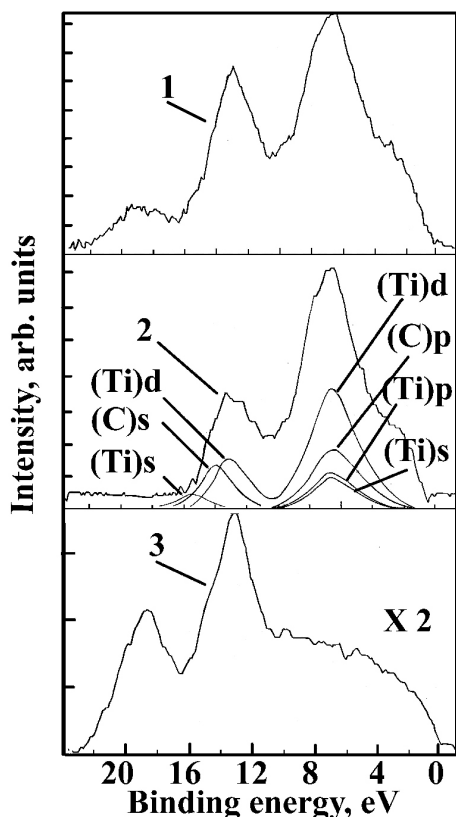


Figure 3. Valence band photoelectron spectra of PVD TiC coating (1), TiC standard (2) and differential spectrum (3)

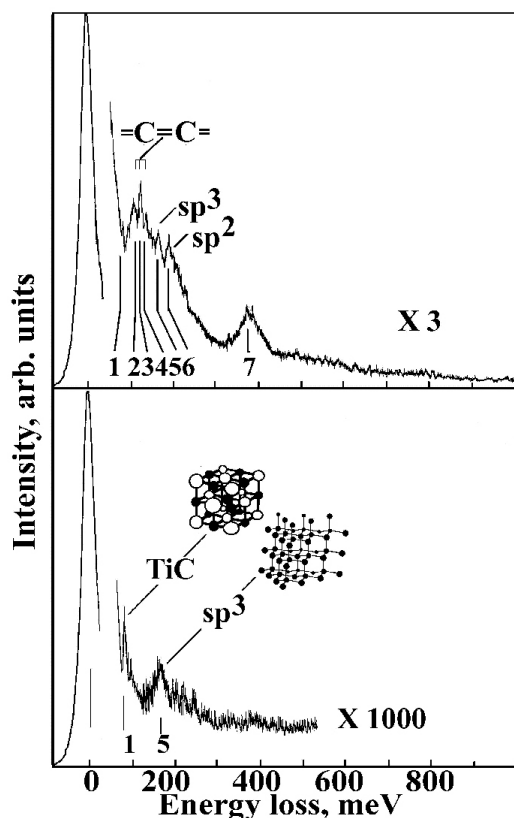


Figure 4. Vibrational spectra of TiC PVD coating, fabricated at pressure of reactive gas of 1.06 Pa before (1) and after Ar+ etching during 900 s (2)

Figure 4. (top and bottom) presents vibrational spectra of the PVD TiC coating with 30% of diamond-like and amorphous carbon, before ion etching and after 900 sec. Ar+ etching. The interpretation of these spectra contains in Table 1.

The ion etching allowed to investigate the peculiarities of phonon spectra in coatings at different depths. The upper spectrum includes high number of peaks tied with carbon out of carbides. The peaks (2–4) at 107, 127 and 130 meV correspond to stretching vibrational modes for =C=C= bonds. Thus the carbyne clusters we observed is probably polycumulene which is consistent with the chemical bonding of beta-carbyne reported in the literature [11, 12]. The peak at 164.0 meV is tied with diamond and other more broad one at 189 meV is the amorphous carbon. The analogous Raman spectrum of the a-C magnetron sputtered films was presented in [14]. The intense and broad peak (7) at 375 meV corresponds to the stretching frequency of CmHn hydrocarbons [13].

The 900 s ion etching has changed the spectrum significantly. The argon etching allowed to reach more deep layers of the coating. The peaks 1 and 5 at 78 and 165 meV are clearly resolved. Its tied with TiC and diamond-like carbon with  $sp^3$  character of hybridization. Evidently that these features are tied with decomposition of carbyne and decreasing of carbon  $sp^2$  fraction, and therefore increase in the number of four-fold coordinated carbon atoms ( $sp^3$ ) and TiC concentration in PVD coating. These data are in good agreement with investigations of other PVD nanocomposite TiC —  $\alpha$ -C: H coatings [16].

Conclusions. 1. The coatings based on titanium and zirconium carbides include stoichiometric and non- stoichiometric phases, diamond-like carbon and carbyne dependent from deposition conditions.

2. Basing on P-T-C diagrams, one can determine optimal parameters of deposition: reaction gas pressure P and substrate temperature T. Such description of process parameters could be applied to widest class of PVD units.

3. The calculated and experimentally determined compositions of coatings at ion plasma deposition are enough close. So the application of calculated P-T-C could be used to get coating with definite composition and properties.

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## Section 8. Medical science

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### Tissue engineering by guided bone regeneration with application of bioglass "Bioactive glass" in patients with diabetes

**Abstract:** "Bioactive glass" refers to a group of surface-active biomaterials. On its surface specific reactions occur, forming an amorphous calcium phosphate and crystalline hydroxyapatite. This has a positive effect on bone formation.

**Keywords:** bioactive glass, bone regeneration, prosthetic dentistry.

In modern medicine and biotechnology, tissue engineering occupies a special place (tissue engineering) — the creation of new tissues and organs for the reconstruction of the damaged organ by means of delivery to the desired region of the supporting structures of cells, molecular and mechanical signals for regeneration. Alloplastic inert materials can eliminate only physical and mechanical defects of damaged or atrophied tissues. The goal of tissue engineering is to restore the biological (metabolic) functions, ie: the regeneration of tissue, and the morphological and functional integrity, as opposed to simple mechanical replacement of its osteoplastic material [2; 3; 4].

For the first time in Sweden for more than 20 years of the development in the treatment of periodontitis are happening In modern medicine and biotechnology, tissue engineering occupies a special place (tissue engineering) — the creation of new tissues and organs for the reconstruction of the damaged organ by means of delivery to the desired region of the supporting structures of cells, molecular and mechanical signals for regeneration. Alloplastic inert materials can eliminate only physical and mechanical defects of damaged or atrophied tissues. The goal of tissue engineering is to restore the biological (metabolic) functions, ie: the regeneration of tissue, and the morphological and functional integrity, as opposed to simple mechanical replacement of its osteoplastic material [1; 3].

The cell material for tissue engineering can be represented by regenerable cells or tissue stem cells. The types of molecular signals for regeneration in tissue engineering among biologically active substances of natural origin include macromolecule — hyaluronic acid, which is a scientific and practical interest in the field of dental implantology with bone grafting. As the polyanion, hyaluronic acid has a high water-holding capacity — one molecule of hyaluronic acid connects 200–300 water molecules. Together with other proteoglycans, hyaluronic acid is a member of the extracellular matrix. Due to its physical and chemical properties such as high viscosity (specific ability to bind water and protein to form proteoglycan aggregates) hyaluronic acid contributes to the manifestation of numerous connective tissue functions [2; 9].

For the purpose from bioactive osteoplastic material reasonable use of bioglass "Bioactive Glass". Osteoplastic material in aggregate with rich platelet rich plasma (PRP) or gyaluronic acid to prevent inflammation and atrophy of the bone on the strength optimization conditions process of reparative in the bone.

Bioactive glass "Bioactive glass" apply (to) group of surface-active bio material, on surface witch of descend row specific reactions, bring to formation amorphous calcium phosphate or crystalline hydroxyapatite, what favorable for formation bone [osseous] tissue. As well this material have ability to release critical concentration ion of Si, Ca, P and Na which one evoke bone formation/osteogenesis. Regenerate of bone [osseous] tissue it is allowed/it can be done on unique granule of bioactive glass.

Given that diabetic patients have low regenerative potential of bone tissue, which is associated with infringement of microcirculation (angiopathy), atherosclerosis, tissue hypoxia, and increased levels of lipid peroxidation. That leads to the urgency of this problem which lies in the optimization of reparative regeneration conditions, providing cellular material and macromolecules in dental implantation. It is particularly important in case of simultaneous recovery of jaw bone tissue. (AB Shabanovich, EV Aleynikov, 2008) [2; 3; 4].

The ability of diabetic patients, in the surgery with bone augmentation and dental implantation, to differentiate osteogenic cells also depend on the preservation or restoration of blood vessels. In the case of poor circulation in the postsurgical field occurs oxygen deficiency, which in turn stimulates the proliferation of fibrous and chondroid tissue instead of bone mineralization process [9; 10].

Maximum accuracy in diagnosing the state of the bone prior to implantation plays a vital role in choosing the optimal implant design and surgical intervention techniques. Most authentically the quality of the bone can be estimated based on the results of X-ray 3D COMPUTER tomography, ultrasound osteometry and the also by surgeon during surgical intervention and visual inspection. However, not always after receiving new information by using this ways, the surgeon is capable of changing the plan of operation [2; 5; 6; 9].

Remote status of the newly formed bone structure around the dental implant determines the degree of osseointegration and design of prosthetics and rehabilitation period [7; 8; 9]. The research work of Swedish scientist, the founder of modern implant Branemark, has proven true osseointegration of the implant in the bone tissue using an implant made of pure titanium [7; 8; 10].

During the intraosseous dental implantation there is also a probability development inflammatory complications associated with infection of incisional wound by oral microflora, especially bone. All operations related to the risk of oral or oral linked are classified as clean-contaminated and require prior and targeted use of antimicrobial drugs, due to the relatively high risk of microbial contamination (V.N. Tsarev P V. Ushakov 2004).

Determination of features of microflora in the pathological focus can become a basis for new approaches to planning dental implant with bone grafting and monitoring the results in patients with inflammatory periodontal diseases as well as to the choice of prophylactic agents with selective antibacterial effect, including on the basis of virulent bacteriophages to periodontal.

The aim of our research is to study the morphological and functional restructuring of the newly formed bone, osseointegration of dental implant and an objective evaluation of the results of tissue engineering with guided bone regeneration with dental implantation in patients with diabetes with apply osteoplasty material bioglass "Bioactive glass".

We examined 40 patients with diabetes between the ages of 20 and 65 with dentition defects and atrophy of the alveolar process of varying degrees, undergoing surgery dental implant with bone grafting in combination with hyaluronic acid (IMPLA, Germany) and platelet-rich plasma (PRP). From bioactive osteoplastic material used bioglass "Bioactive glass".

The patients and the test results of the clinical bone grafting drawn from the treatment setting in the clinic Surgical Dentistry of the Tashkent State Institute of Dental and from the dental clinic «Zahne na Clear» in Kassel (Germany) and from the Institute of Endocrinology, Ministry of Health of the Republic of Uzbekistan. The research work carried out at the Department of surgical dentistry and dental implantology and in the Department of Normal and Pathological Physiology, Microbiology, Pharmacology, of the Tashkent State Dental Institute in the 2015–2016 years.

Table № 1. – The distribution of patients by age and sex, abs. (%)

Gender	Age patients, years				Total
	20–30	31–40	41–50	50 or more	
Men	2 (5%)	5 (12,5%)	7 (17,5%)	9 (22,5%)	23 (57,5%)
Women	1 (2,5%)	3 (7,5%)	5 (12,5%)	8 (20%)	17 (42,5%)
Total	3 (7,5%)	10 (25%)	12 (30%)	17 (42,5%)	40 (100%)

Microbiological examination included selection of microflora from saliva collected via oral rinses with sterile saline. Identification of isolated bacteria, using anaerobic culture techniques. Taking the material was performed eight times: before surgery before and after prescribing.

The capture of the material after the operation was carried out in the early stages after 3, 7, 14, 30 days after the dental implantation.

It is known, that an infectious-inflammatory processes significantly increases the probability of graft rejection. By this, it is urgent to develop activities aimed at the prevention of these complications arising during this kind of intervention.

In recent years, in the global dental practice, when performing dental implant, actively implemented methods of the preoperative

prevention based on the use of highly effective antiseptics and antibiotics (VN Tsarev, RV Ushakov VI Chuvilin, 2000).

However, for prescribing effective drugs of directed action (antibiotics) it is necessary to have clear evidence of a potential-aggressive microbial flora of the patient and its sensitivity to various antibiotics.

Taking into account the above aspects, prior to the microbiological and immunological studies of oral fluid in patients with diabetes to whom recommended dental implantation, we assessed the effectiveness of the use of several drugs, such as: metrolin, metrogil, loroben, sispres 500, in order to preoperative preparation of patients, in conditions in vitro! The data obtained in these studies are shown in Table № 2.

Table № 2. – Sensitivity Characteristics of microbes to some drugs in the conditions in vitro!

№	Microorganisms	Materials	Metrogil	Loroben	Sispres 500
1	Staphylococcus aureus	5,0±0,1	0	25,0±0,4	27,0±0,5
2	Staphylococcus epidermidis	0	7,0±0,1	17,0±0,3	35,0±0,5
3	Staphylococcus saprofiticus	0	7,0±0,1	5,0±0,1	35,0±0,5
4	Streptococcus pyogens	0	5,0±0,1	12,0±0,2	27,0±0,5
5	Ent.faecalis	0	0	20,0±0,4	22,0±0,4
6	Esch.coli ΔII	0	5,0±0,1	20,0±0,4	30,0±0,5
7	Esch.coli ΔH	0	5,0±0,1	12,0±0,2	40,0±0,5
8	Prot.vulgaris	5,0±0,1	7,0±0,1	15,0±0,3	27,0±0,5
9	Klebsiella	5,0±0,1	5,0±0,1	15,0±0,3	35,0±0,5
10	Ps.aerogenosa	5,0±0,1	18,0±0,4	12,0±0,2	30,0±0,5
11	Candida albicans	0	0	12,0±0,2	5,0±0,1
12	Aktinomycetae	5,0±0,1	7,0±0,1	15,0±0,3	40,0±0,5

Notes: Unit in mm microbial growth inhibition zone (mm).



The table shows that the drug metrogil not has antibacterial properties, at the same time drug metrogil had a significant impact on the culture (*Pseudomonas aerogenosa*) which amounted to  $18,0 \pm 0,4$  mm.

Drug loroben has effects on almost all studied groups of microbes, except for culture *Staphylococcus saprofiticus*. Interestingly, this drug were moderately sensitive both gram-positive and gram-negative microbes including fungi.

Among all tested drugs the strongest antibacterial effect had a sispres 500. As can be seen from the table, highly sensitive were *eshirihii* and *actinomycetes*, which equaled  $40,0 \pm 0,5$  mm. and the remaining groups tested germs were also highly sensitive from

$22,0 \pm 0,4$  to  $35,0 \pm 0,5$  mm, and only fungi of the genus *Candida* seemed insensitive.

Microbiological studies of quantitative parameters of microbes in the mouth of patients with diabetes mellitus after preparation pre operating using the above drugs are presented in Table № 3.

The table shows that all the studied groups of microbes have a positive quantitative shift is actually close to normal and only the number of *Candida* fungi several high data apparently used drugs do not have antifungal activity.

The next group of our study consisted of patients with diabetes who underwent dental implantation.

Table № 3. – Indicators of oral fluid flora in patients with diabetes mellitus Ig ( $M \pm m$ )cfu/ml

№	Groups of microbes	Number of microbes in 1 ml saliva		
		Norm	For patients with diabetes mellitus	
			On admission	After receiving the drug
1	Total anaerobes	$7,6 \pm 0,27$	$4,85 \pm 0,15$	$5,15 \pm 0,16$
2	Lactobacillus	$5,80 \pm 0,21$	$2,20 \pm 0,13$	$4,30 \pm 0,17$
3	peptostreptokokki	$5,60 \pm 0,24$	$4,60 \pm 0,21$	$4,85 \pm 0,11$
4	Total aerobicee	$6,10 \pm 0,25$	$7,30 \pm 0,31$	$5,60 \pm 0,17$
5	<i>Staphylococcus aureus</i>	0	$3,15 \pm 0,14$	0
6	<i>Staphylococcus epidermidis</i>	$3,0 \pm 0,13$	$4,0 \pm 0,16$	$2,0 \pm 0,1$
7	<i>Streptococcus salivarius</i>	$4,30 \pm 0,21$	$5,15 \pm 0,11$	$3,45 \pm 0,15$
8	<i>Streptococcus mutans</i>	$2,15 \pm 0,10$	$4,10 \pm 0,15$	$2,15 \pm 0,12$
9	<i>Streptococcus mitis</i>	$2,60 \pm 0,15$	$3,85 \pm 0,11$	$2,85 \pm 0,13$
10	Versus	$1,30 \pm 0,01$	$3,10 \pm 0,12$	$1,45 \pm 0,01$
11	<i>Eshirihii</i>	$1,20 \pm 0,01$	$2,30 \pm 0,11$	0
12	Fungi	$2,0 \pm 0,15$	$4,10 \pm 0,21$	$3,0 \pm 0,15$

Microbiological examination of these patients after surgery performed in dynamics: 3–7-14–30 on days -that was the early period of observation, these same patients in the study continued and long-term periods of observation — is 3–6 months. Materials of microbiological studies carried out in the early stages of the observation are shown in Table № 4.

The table shows that on day 3 after surgery microbial picture is somewhat deteriorated in comparison with the picture pre operation. At the same time, these changes have a tendency anaerobic flora decreased slightly, but increased somewhat the facultative. It is particularly alarming, the emergence of oral strains of pathogenic staph (*Staphylococcus aureus*).

Table № 4. – Characteristics of oral flora in patients with diabetes, after dental implantation and bone grafting in the early stages. Ig ( $M \pm m$ ) CFU/ml

№	Groups of microbes	Number of microbes in 1 ml saliva				
		Before the operation	After implantation			
			3 days	1 week	2 weeks	1 month
1	Total anaerobes	$5,15 \pm 0,16$	$4,30 \pm 0,15$	$6,15 \pm 0,18$	$6,0 \pm 0,15$	$6,10 \pm 0,21$
2	Lactobacillus	$3,30 \pm 0,17$	$3,0 \pm 0,14$	$5,11 \pm 0,15$	$5,0 \pm 0,17$	$4,60 \pm 0,16$
3	Peptostreptokokki	$2,85 \pm 0,11$	0	$2,10 \pm 0,2$	0	$1,0 \pm 0,01$
4	Total aerobicee	$5,60 \pm 0,18$	$6,10 \pm 0,18$	$5,30 \pm 0,19$	$7,10 \pm 0,21$	$6,30 \pm 0,23$
5	<i>Staphylococcus aureus</i>	0	$2,10 \pm 0,11$	0	$2,10 \pm 0,1$	0
6	<i>Staphylococcus epidermidis</i>	$2,0 \pm 0,10$	$3,0 \pm 0,13$	$1,30 \pm 0,01$	$3,0 \pm 0,13$	$2,60 \pm 0,11$
7	<i>Streptococcus salivarius</i>	$3,45 \pm 0,15$	$4,10 \pm 0,15$	$4,0 \pm 0,21$	$5,0 \pm 0,21$	$4,15 \pm 0,17$
8	<i>Streptococcus mutans</i>	$2,15 \pm 0,12$	$2,0 \pm 0,11$	$3,0 \pm 0,15$	$5,0 \pm 0,8$	$4,0 \pm 0,15$
9	<i>Streptococcus mitis</i>	$2,85 \pm 0,13$	$2,10 \pm 0,10$	0	0	$3,0 \pm 0,12$
10	Versus	$1,45 \pm 0,01$	0	0	0	0
11	<i>Eshirihii</i>	$1,0 \pm 0,01$	0	0	$1,60 \pm 0,1$	0
12	Fungi	$3,0 \pm 0,15$	$2,30 \pm 0,11$	0	0	$1,30 \pm 0,1$

Interestingly, in the observations on 7 the day microflora of the oral cavity differ mostly positive changes, so anaerobic flora even increased in comparison with the picture before the operation.

Optional flora close to the norm, which is particularly pleasing, that one that some microbes such as pathogenic staphylococci, *Streptococcus mitis*, against *Eshirihii* and fungi in general i. e. eliminated the disappeared, and it is these microbes, mostly due to the large set of fragments pathogenicity, and are the cause of inflammation after surgery.

On 14th day of the study can be noted that improvements available at 7 days, not only retained, but also further improved because anaerobic flora was slightly higher compared to pre operation.

However, the alarming increase in the number of facultative flora, so the total number of the picture was  $\lg 7,10 \pm 0,21 \text{KOE/ml}$ . Apparently the picture can be explained by the fact that on the 14th day ended compensatory adaptive processes in the oral cavity and the dose of drugs were found sufficient to suppress facultative flora. and observed the emergence of strains of pathogenic staphylococcus.

However, the most interesting picture of the oral microflora we observed in the 30 day study, the actual quantitative parameters

flora in anaerobic as well, and an optional very close to the normal range, and is particularly pleased with the elimination of such of microbes as pathogenic staphylococci, *Proteus* and *eshirihii*.

We would like to emphasize that these positive developments occurring in the microflora of the oral cavity in patients with diabetes who underwent dental implants and bone grafting correlate with the picture of the clinical course of these patients.

In table № 2 figures, at patient's admission, *Staf Aureus* in liquid oral flora is present in significant amounts. After receiving the drug prior to surgery, he is eliminated. Further *Strep. Mutans* fungi, at admission of patient, exceeds the norm by 2 times. Then, after taking the drug figures are normalized.

In Table № 5 on the 3rd day after the operation the number of *Staf. aureus* risen again. By the 1st week after surgery it normalizes. By the 2nd week indicator *Staf. aureus* grows.

This is because the medication after the operation is completed at the expiration of 1 week after implantation. The same trend is observed in *Strep. mutans*. A figure *Strep. Salivarius* to 2nd week increased slightly, and the first month is normalized.

Table № 5. – Indicators of local oral defense factors in patients with diabetes, after dental implantation, in the early stages

№	Indicators	Norm	Patients with diabetes.		After operation			
			on admission.	before surgery	3 day	1 week	2 weeks	1 month
1.	The titer of lysozyme (mg/%)	18,0±0,50	13,50±0,21	16,30±0,18	11,0±0,3	13,0±0,4	12,0±0,2	15,0±0,3
2.	Phagocytosis index (%)	55,3±2,4	42,0±2,15	48,0±3,0	42,0±2,0	46,0±3,0	42,0±4,0	49,0±4,0
3.	Levels of secretory immunoglobulin A/iga IgA/g	2,10±0,11	1,10±0,10	1,20±0,10	1,10±0,1	1,20±0,1	1,0±0,1	1,40±0,1

In the table № 5, at admission, indicator of the titer of lysozyme reduced.

Before the operation, after taking the medicines it is close to normal. Further to third day after surgery, the level of its amount reduced due to traumatic shock. In subsequent periods, his figure is closer to the norm.

The morphological and functional evaluation of bone tissue reconstruction after guided bone regeneration with the use of hyaluronic acid, we carried out a dynamic study of the structure of the bone tissue before and after dental implantation. Bone density was assessed by Haunsfield scale units — HU on the results of the 3D X-ray multispiral computed tomography «Sirona — Galileos» (Germany), «VOLUX-Triana» (South Korea), «MORITA» (Japan), Philips (Germany), radiovisiography (the unit «AnyRay-ANR2-0210», the sensor «EzSensor-CR1, 5D-09-0020», VatechE-WOOTechnology, South Korea).

The program allows you to map gray values on the CT scan linearity of gray on the monitor, which objectively assesses the structure and bone density.

We obtained data the average bone density units scale Haunsfield — HU comparatively evaluated the results obtained Misch classification of bone type.

1) 1150 and more Haunsfield scale units — HU, consistent with Misch classification type D1 bone (dense homogenous compact bone substance, a little spongy tissue);

2) 840–1150 Haunsfield scale units — HU consistent with the classification Misch bone type D2 (dense homogenous compact bone substance, spongy tissue coarse-grained, with a distinct trabecular structure);

3) 330–840 Haunsfield scale units — HU consistent with the classification D3 Misch type of bone (a thin layer of cortical bone, close-meshed cancellous bone with a distinct trabecular structure);

4) 145–330 Haunsfield scale units — HU consistent with the classification Misch bone type D4 (very thin layer of cortical bone, cancellous bone loose);

The data allow us to determine the morphological and functional restructuring during the dental implant with bone grafting and dental implants functioning in patients with diabetes.

At the results of the studies defined a proportional change in bone density depending on the time of implantation and functional loading of the implant. Studies show that one year after guided bone regeneration of bone tissue growth is up 95%.

To determine the primary stability of the implant and the analysis of remote results of intraosseous dental implant osseointegration used instrument «Osstell ISQ» the production of the company Integration Diagnostics (Sweden) tuned to a resonant frequency analysis of the RFA (Resonance Frequency Analysis) determines the rate of implant stability.

All patients during and after surgery was performed measurement ISQ (Implant stability Quotient)/ISQ (implant stability factor) in certain periods. During the operation, before closing the wound and in terms 1–2–4–6–9–12–24 months.

Integration of bone components, due to the formation of mineralized areas of direct contact with the bony structures of the implant surface. The integration of the implant with bone structure more pronounced than in previous terms in all comparative groups.

The best indicator of ISQ/CSI for the secure functional load is higher than 70 units. In assessing osseointegration of implants precision measurement stability, in instrument indication «Osstell» (Sweden) sufficiently rigidly attached components installed repeatability with high accuracy. An objective method for primary stability studies and distant osseointegration of dental intraosseous screw implants to evaluate the primary stabilization of the implant.



Figure 1. a) a device for measuring ISQ/CSI b) attach magnetized parts in the implant), b) and measuring the mesiodistal direction vestibulooralnom

Table № 6. – Average values ISQ (implant stability factor), ISQ – (implant stability quotient)

Terms groups	During the operation	1 mon.	2 mon	4 mon.	6 mon.	9 mon.	12 mon.	24 mon.
Implantation patients diabetes type 2 with bone quality D1	74±1,5	74±1,5	80±1,5	82±1,5	82±1,5	84±1,5	86±1,5	86±1,5
Implantation patients with type 2 diabetes with bone quality D2-D3	73±2	71±2	78±2	83±2	84±2	84±2	85±2	88±2
Implantation patients with type 2 diabetes with bone quality D4	55±0,5	50±0,5	68±0,5	74±0,5	78±0,5	80±0,5	82±0,5	84±0,5
Implantation of healthy patients with the quality of the bone tissue-D1-D2	71±1,5	65±1,5	68±1,5	74±1,5	78±1,5	82±1,5	83±1,5	84±1,5
Implantation of healthy patients with the quality of the bone tissue-D3-D4	50±1,0	48±1,0	50±1,0	60±1,0	70±1,0	72±1,0	76±1,0	80±1,0

### Conclusion

1. The data on assessment of the bone structure indicate the rationality and objectivity of research methods to facilitate a correct assessment of the state of the bone tissue before implantation and the choice of method of implantation and osteoplasty.

2. In use of osteoplastic material bioglass "bioactive glass" in aggregate with PRP or hyaluronic acid to prevent inflammation and atrophy of the bone under optimization conditions of reparative process in the bone

3. The use of hyaluronic acid activates inhibitors or retarders metalloproteinaz and thus effectively prevents the destruction of tissues. A similar effect is achieved by slowing the cytokines that cause inflammation (eg TNF  $\alpha$ ). Thus, hyaluronic acid may help preserve tissues.

4. This microbiological research suggests a positive impact sound application of antimicrobial and antiseptic agents on wound regeneration after dental implantation.

5. Targeted use of antimicrobials help to reduce the concentration of microorganisms in periodontal surgical wound and reduces

the number of inflammatory complications. Predict the possible inflammatory complications in the postoperative period in the species composition of microorganisms and to conduct timely medication.

6. Dynamic observation of morphological and functional restructuring of the bone tissue can correctly determine the optimal time of prosthesis and prevents complications in patients with diabetes during dental implantation with bone augmentation, followed by a decrease in terms of rehabilitation.

7. By the method of resonant frequency implant stability analysis and evaluation of the quality of bone Haunsfield scale units — HU can prevent complications associated unreasonable early loading of the implant.

8. Using the device "Osstell ISQ" tuned to a resonant frequency analysis of the RFA (Resonance Frequency Analysis) to assess the primary stability of the implant rate and distant osseointegration, to prevent complications related to unreasonable early loading of the implant, and the choice of optimal period of prosthetics and reducing the time of prosthetic treatment.

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## Quality of life before and after treatment for supratentorial brain tumors in children

**Abstract:** The analysis of data of 97 children with brain tumors of supratentorial localization was carried out. To estimate treatment efficacy was used a rating scale of quality of life. It was determined that the quality of life of patients with brain gliomas depends on localization of neoplastic process, histological properties of tumor, preoperative neurologic deficit and the patient's compensated condition.

**Keywords:** quality of life, brain glioma, central nervous system, pediatric age.

### Introduction

Tumors of the central nervous system (CNS) occupy the second place in the structure of malignant neoplasms in children after leukemia. Hemispherical supratentorial tumors are represented mainly by astrocytic tumors [3; 6; 9].

Currently, the quality of life is of much attention when evaluating results and efficacy of treatment. In scientific medical literature, the concept of the quality of life has been used since 1977. According to the reports of a conference of the American Society of Clinical Oncology, held in 1990, the quality of life is a main criterion for evaluating results and effectiveness of treatment of cancer patients [1; 2; 4; 5].

At the present, the most important task of neurosurgeons is not only tumor removal, but also improvement of the quality of life of patients by preserving the most important functional brain structures [6; 8; 10].

In domestic pediatrics, concept of the study of quality of life developed in the early XXI century. On the one hand, this concept allows returning to a fundamental principle of clinical practice "do not cure the disease, cure the patient", and, on the other hand, offers a well-developed methodology that allows to obtain reliable data of the quality of life of children both in clinical practice and in researches. Along with traditional clinical indicators, evaluation of the efficacy of the child's treatment should be based on the parameters of quality of life. The concept of "quality of life" in pediatrics includes the definition of "child's quality of life", main characteristics of the definition of "child's quality of life", the methodology of the study the quality of life and the main directions of studying the quality of life in pediatric patients [6; 7].

Hence, the quality of life of children with supratentorial brain gliomas is a main criterion for evaluating the patient's condition and treatment efficacy.

**The purpose of study** was to assess the efficacy of treatment of patients with supratentorial brain gliomas in the process of comprehensive treatment using a rating scale of quality of life.

### Materials and Methods

This study is based on the results of treatment of 97 children with supratentorial brain gliomas at the age from 10 months to 16 years, who were treated in pediatric neurosurgical department of RSCN. Clinical diagnosis and surgical approach were determined based on brain CT and MRI studies. Assessment of quality of life was conducted by a developed programme "scale for determining the quality of life of children with supratentorial tumors".

Comparative analysis of the quality of life was conducted prior to the operation and after surgery at the time of patient's discharge from hospital. In neurological status were observed movement disorders in 55 (56.7%) patients in the form of paresis or plegia, different kind of speech disorders in 34 (35.0%) children, hypertensive symptoms in 91 (93.8%) sufferers, deterioration of psychic activity in 17 (17.5%) patients, and visual impairments in 11 (11.3%) patients, respectively. Epileptiform seizures were noted in 29 (29.9%) patients.

### Results and Discussion

Postoperative rehabilitation is a component of comprehensive treatment for cerebral gliomas in children. All 97 patients received restorative treatment (RT) in the postoperative period, which included drug treatment, massage, and electrical stimulation. In the early postoperative period, all patients underwent drug therapy aimed to eliminate brain edema, microcirculatory and neurodynamical disorders. Drug treatment included preparations, improving synaptic transmission, vascular drugs, corticosteroids, and protease inhibitors. After drug therapy, patients had positive dynamics, manifested by increase in volume of motor function, restoration of speech, as well as regression of hypertensive symptoms.

Tumor localization also affected the results of treatment. Accordingly, at defeat of brain speech-motor areas, qualitative indicators were lower, indicating more significant neurological deficit and psychosocial disadaptation.

Table 1. – Scale for determining the quality of life of children with supratentorial tumors

Clinical syndromes	Qualitative characteristics	Scores
1	2	3
<b>I. Psycho-neurological status (80 points)</b>		
1. Level of consciousness	Norm	10
	Stun (response to verbal commands)	5
	Stupor (response only to pain) or coma	0

<b>1</b>	<b>2</b>	<b>3</b>
2. Headache, nausea, vomiting, dizziness (cerebral symptoms)	None	10
	Insignificant	5
	Significant	0
3. Deterioration of psychic activity	Absent	10
	Loss of memory and remembering	5
	Disintegration	0
4. Seizures	Absent	10
	Rare	5
	Frequent	0
5. Motor and sensory disorders	Absent	10
	Hemiparesis and hemihypesthesia	5
	Hemiplegia and hemianesthesia	0
6. Visual impairments	Absent	10
	Reduced vision	5
	Blindness	0
7. Speech disorders	Absent	10
	Partial	5
	Full	0
8. Extrapyrarnidal disorders	Absent	10
	Partial	5
	Full	0
<b>II. Social adaptation (20 points)</b>		
Family (home) and labor (social) adaptation	Full employability and self-service (learning abilities and interests to playing activity).	20
	Disability and self-service (learning abilities and interests to playing activity).	10
	Incapacitated and not capable of learning and self-care (needs constant assistance).	0

Table 2 demonstrates that the quality of life is lower at localization of tumor in fronto-parietal and fronto-temporal lobes that are responsible for motor and speech functions. The quality of life also depends on the prevalence of tumor in the brain medial struc-

tures. At localization of tumor in the occipital lobe, poor quality of life was observed mainly in 1 (7.1%) patient, associated with visual photopsia and quadrant hemianopsia.

Table 2. – Relationship between quality of life and tumor localization in the preoperative and postoperative periods

Quality of life in pre- and postoperative periods		Localization of tumor												Total	
		Fronto-parietal		Fronto-temporal		Fronto-parieto-temporal		Temporo-parietal		Occipital		Medial structures			
		Abs	%	Abs	%	Abs	%	Abs	%	Abs	%	Abs	%		
Good	Before surgery	2	11.1	3	17.6	2	11.7	3	23.0	6	42.8	3	16.6	19	19.5
	After RT	8	44.4	9	52.9	7	41.1	6	46.1	11	78.5	8	44.4	49	50.5
Satisfactory	Before surgery	5	27.7	4	23.5	6	35.3	4	30.7	7	50.0	5	27.7	31	31.9
	After RT	6	33.3	5	29.4	7	41.1	6	46.1	3	21.4	7	38.8	34	35.0
Poor	Before surgery	11	61.1	10	58.8	9	52.9	6	46.1	1	7.1	10	55.5	47	48.4
	After RT	4	22.2	3	17.6	3	17.6	1	7.6	0	0	3	16.6	14	14.4

Table 3 shows that the efficacy of treatment also depended on malignancy grade of tumors. Tumors of I–II grade (Low grade) belonged to tumors of low-grade malignancy, and tu-

mors of III–IV grade (High grade) belonged to tumors of high-malignancy grade. The higher malignancy grade, the lower the quality of life.

Table 3. – Dependence of the quality of life on anaplasia grade of tumor

Quality of life in pre- and postoperative periods		Grade of malignancy								Total	
		I grade of anaplasia		II grade of anaplasia		III grade of anaplasia		IV grade of anaplasia			
		Abs	%	Abs	%	Abs	%	Abs	%	Abs	%
Good	Before surgery	7	7.2	6	6.1	4	4.1	2	2.06	19	19.5
	After RT	18	18.5	11	11.3	11	11.3	9	9.2	49	50.5
Satisfactory	Before surgery	10	10.3	8	8.2	7	7.2	6	6.1	31	31.9
	After RT	5	5.1	9	9.2	9	9.2	11	11.3	34	35.0
Poor	Before surgery	7	7.2	9	9.2	13	13.4	18	18.5	47	48.4
	After RT	1	1.03	3	3.1	4	4.1	6	6.1	14	14.4

### Conclusions

1. The efficacy of treatment of brain supratentorial gliomas depends on the severity of clinical manifestations of disease, localization of tumor, its size, malignancy grade, tumors prevalence in surrounding functionally important brain structures and volume of remote tumors.

2. The total score of all indicators allows characterizing the quality of life of patients at the time of examination. The increase in total score during patients follow-up indicates in a positive dynamics of the disease course or rehabilitation period, while its decrease indicates a negative trend.

3. A scale developed by us for determining the quality of life of children with supratentorial tumors is adapted to patients with brain tumors and could be used for children with brain lesions of supratentorial localization of different origin (trauma, cancer, vascular diseases, etc.).

4. Comprehensive treatment, including surgical removal of tumor and the course of restorative treatment, helps improve the quality of life of patients in the postoperative period.

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## Estimation of an average face zone after the primary cleft lip repair with congenital cleft upper lip and palate

**Abstract:** The orthodontic treatment directed on an establishment of fragments of the upper jaw in correct position, the prevention of narrowing of tooth alignments after uranoplasty, does not provide stable results and often it appears inefficient. The analysis of photos of patients under the modified scheme and computer design helps to reveal the most typical aesthetic infringements of the person, to model forthcoming changes with forecasting of optimum balance of a profile and a bite in each specific case separately.

**Keywords:** Congenital cleft upper lip, orthodontic treatment, face zone, children.

Congenital cleft upper lip, alveolar process, hard and soft palate, being heavy developmental anomaly of maxillofacial area, it is characterised by the expressed structural and functional infringements. Reatment of this anomaly of development remains to one of the most complicated problems of maxillofacial surgery [1; 2; 10].

Domestic and foreign scientists develop effective methods of elimination congenital cleft upper lip and palate [2] and corrections of deformation of a nose [3; 4]. The orthodontic treatment directed on an establishment of fragments of the upper jaw in correct position, the prevention of narrowing of tooth alignments after uranoplasty, does not provide stable results and often it appears inefficient [5; 8]. After primary operations on a lip and palate 35–89% of patients have deformations of a skeleton of an average face zone [3; 9]. Their elimination is impossible without orthodontic surgical treatment. However, after surgical treatment relapses are marked at 25–50% of the operated patients [6; 7; 10].

**The aim of study** was to study of the remote results primary cleft lip repair at children with a congenital cleft of an upper lip and palate and to reveal the most typical aesthetic infringements of an average face zone.

**Materials and research methods.** For a quantitative estimation of the found out aesthetic face defects at patients with a congenital cleft of an upper lip and palate after primary surgical lip and palate spent anthropometrical measurements of the person. By means of the goniometric device measured such important indicators of the person as a corner of camber of the person, nose-lip fold the corner, a corner of the bottom jaw etc. in a profile defined the Typical accessory of the person in the standard anthropometrical way, the received indicators compared also to the standard norms.

Symmetry of face zones defined on a difference of distances of the left and right halves of the face to medial-sagittal planes and between occlusion and under eye-socket planes. For this purpose, to the patient allowed to bite a ruler and spent corresponding measurements of the right and left halves of the face. Measurement of the linear and angular sizes and their mutual relations has been in total spent. For an additional estimation of infringements of a face proportion and an estimation of results of complex treatment at patients with congenital cleft upper lip and palate Studied photos of the

person (fas and a profile). For reception of exact identical photos fas and a profile, a bite and other positions of the person photographing was spent in identical conditions with use photostat. For shootings used the digital camera (Canon 14 megapicsel). Photostatic pictures received, using the standard technique with observance of the rules offered V.A. Pereversim (1989) and to insert W. Gubish (2005).

**Results of research.** The received photos were studied by the standard technique with carrying out of computer design. Spent formation of optimum balance of a bite and a profile of the person with use of a photo of a profile and a bite in each specific case individually. Also defined a typical accessory of the person en face and a profile, the general a facial angle, a corner of an average part of the person a corner of an alveolar part of the person. At definition of aesthetic infringements of the person of patients used following lines: a Drejfusa-perpendicular, lowered from a point nasion on the Frankfurt horizontal. Schwarz's line (an oral tangent) passes through points subnasal and pogonion. Linija K. K. — a tangent a line to a contour of a red border top and lower lips. Linija L. P. — «an obverse plane», passing through points nasion and pogonion. On an arrangement top and lower lips to a line of Rikettsa (an aesthetic plane) defined type of a profile of the bottom part of the person. For definition of a parity of lips used corner Z. Profile corner of person T defined by means of a perpendicular lowered from a point nasion, and its crossing from an oral tangent (a line subnazale-gnation). Thus proceeded from the standard norm of this corner 10 C at optimum balance of the person. If this corner is more 10 C, spoke about a profile cut *кзади* if it is less 10 C — about a profile cut *forward*. All these measurements easily spent on a computer graphic representation of a head and the person of the patient. Under the described scheme photos of the person en face and a profile at all patients before operation and in the remote terms after complex treatment have been analyzed. With computer graphics use spent modelling of optimum balance of a profile of the person and a bite in each specific case separately.

**Conclusions.** The analysis of photos of patients under the modified scheme and computer design helps to reveal the most typical aesthetic infringements of the person, to model forthcoming changes with forecasting of optimum balance of a profile and a bite in each specific case separately.

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## Comparative analysis of the immune system at often and rarely ill children depending on the stage of disease

**Abstract:** The article is devoted to the study of the immune system (IS) and cytokine status in frequently ill children (FIC) in the acute phase and remission in comparison with rarely ill with children (RIC). The immune status in these children not infrequently formed were transiently response by Th2-type by hyperproduction of IL-4 and IL-1 $\beta$ , stimulating high production of IgE by B lymphocytes IgA against decrease synthesis.

**Keywords:** children, immune system, cytokine status, respiratory diseases, immune cells.

Problem defeat limfoadenoid pharyngeal ring Pirogov-Waldayer from FIC is relevant, since this tissue is morphofunctional substrate local immunity. In terms of lymphoid tissue hyperplasia and concomitant chronic exudative-proliferative inflammatory viral infection begins to exhibit the properties of the trigger, inducing infectious-dependent immunopathological condition, as well as autoimmune reactions, often manifested by at FIC [1–3].

Recent studies have shown that FIC even during clinical well-being and the absence of signs of ARI identifies distinct changes in cell-cell interactions in the immune system: significantly increased the content of pro-inflammatory interleukins (IL-2, IL-4), including interleukins involved in chronic inflammation (IL-6, IL-8). This is accompanied by a decrease in cell cytotoxicity and increased levels disimmunoglobulinemia cells expressing receptors that induce apoptosis. In this regard, we have been set a target [4–7].

**The purpose:** To examine the performance of the immune system in FIC and RIC, depending on the stage of the disease in a comparative perspective.

**Materials and methods.** We carried out a study on the state of the immune system in children surveyed, depending on the stage of the disease (remission and relapse stage): In the group of FIC, the number of children was 28, whereas in the group (RIC) — 20.

Criteria for selection of children in the FIC group formulated in 1986 and V.Yu. Albitski A. A. Baranov.

- up to a year — 4 and more;

- up to 3 years — 6 or more;
- 4–5 years — 5 or more;
- Over 5 years — 4 and more.

This takes into account SARS, and exacerbation of chronic diseases of ENT — organs and respiratory tract (I. E. Elagina, M. R. Bogomilsky, 2004).

Immunological studies were performed at the Institute of Immunology of the Academy of Sciences of Uzbekistan. The main parameters of cellular and humoral immunity was determined by identifying the cell surface cluster of differentiation of CD3, CD4, CD8, CD16, CD19 with monoclonal antibodies Series LT (LLC “Sorbent Service”, Russia). The study of the concentration of serum immunoglobulin A, M, G in peripheral blood was performed according to the method Mancini G. et al (1965). Levels of cytokines (IL-1 $\beta$ , IL-4 and TNF $\alpha$ ), IgE and sIgA in nasal washes were determined by ELISA (cytokines produced by “Cytokine”, St-Petersburg). Statistical analysis of the data obtained by the methods of variation statistics, Fischer-Student

**Results and discussion.** The next stage of our work was to study the above immunological parameters, depending on the stage of the underlying disease.

Analysis of the data showed a significant difference, as in the period of exacerbation and remission in level CD3+ lymphocytes in sickly children compared to those suffering from rare (P<0,05). Also, a significant difference was observed in the reduction of



CD4<sup>+</sup>-lymphocytes in sickly children in the acute phase ( $P < 0,01$ ). The smallest number of T-suppressor cells defined in the acute stage at FIC, but fluctuations are unreliable, that still caused significant reduction in the immunoregulatory index in the group. In the group of FIC in remission as a decline of the index, but compared to the RIC data unreliable.

In studying the factors of nonspecific protection significant difference of all parameters in the acute phase and in remission from frequent and prolonged ill children. Thus, the level of natural killer cells in the group of FIC in the acute stage was  $18,0 \pm 1,1\%$ , and in remission —  $13,9 \pm 0,7\%$  in comparison with the group RIC —  $14,3 \pm 1,0\%$  and  $11,2 \pm 0,7\%$ , respectively ( $P < 0,05$ ).

Data analysis of the phagocyte activity of neutrophils showed that in the period of acute level of phagocytosis was significantly reduced, both in the group RIC, and in the FIC group ( $54,5 \pm 1,2\%$  vs  $50,7 \pm 1,1\%$ ,  $p < 0,05$  and  $48,3 \pm 1,2\%$  vs  $43,6 \pm 0,9\%$ ;  $p < 0,05$ ). Rate increase was observed in the content of B cells ( $P < 0,05$ ).

Revealed that the FIC with concomitant ENT pathology shows signs disimmunoglobulin-emia with higher levels of IgG, and a significant decrease in the concentration of IgA, IgM more pronounced in the acute stage of the basic pathological process.

In particular, the level of IgG group FIC in the acute stage was  $1420 \pm 38\text{mg}\%$ , and in remission —  $1160 \pm 22\text{mg}\%$  in comparison with the group RBD —  $930 \pm 19\text{mg}\%$  and  $1050 \pm 25\text{mg}\%$ , respectively, ( $P < 0,01-0,001$ ). It should be noted marked decrease secretion of IgA in the acute stage at FIC,  $P < 0,01$ . In other words, the spread of inflammation to the lymphoid tissue of the upper respiratory tract is associated with severe proliferative IgA, indicating mobilization of reserve capacity of local immunity in chronic inflammation.

With frequent acute respiratory epithelial damage the respiratory tract gets receptor hyper-sensitivity to external influences. In the immune status of these children are often transiently formed response to Th2-type with overproduction of IL-4 and IL-1 $\beta$ , enabling high production of B-lymphocytes against decrease in IgE synthesis of IgA.

In our study showed a significant decrease in IL-1 $\beta$  in the acute stage at FIC,  $P < 0,05$ , and in remission on the contrary increase that is more than 2-fold compared with a group of children suffering from rare,  $P < 0,05$ . The level of IL-4 in sickly children during episodes of exacerbation was significantly increased ( $18,1 \pm 2,4\text{pg/ml}$  vs  $13,5 \pm 1,6\text{pg/ml}$  in the RIC,  $P < 0,05$ ).

A similar trend is observed in the study of the level of TNF $\alpha$ . Progressive dynamics increasing concentrations of IL-4, TNF $\alpha$  in the serum of sickly children in the acute phase of the basic pathological process is associated with a more pronounced effect of the exposure of frequent and complicated by recurrent episodes of infection of the upper respiratory tract for a long time

Thus, the FIC is a problem that has not only medical, but also the socio-economic aspect, which requires a comprehensive approach to deal with it in the implementation of therapeutic, rehabilitative and preventive measures for the FIC.

#### Conclusions:

1. Depending on the stage of the underlying disease revealed significant differences, both in acute and in remission. The level of CD3<sup>+</sup>, CD4<sup>+</sup> lymphocytes, phagocyte activity of neutrophils and immunoregulatory index in frequently ill children in the acute stage in 1,2 times less ( $P < 0,05$ ), than compared to remission, and the level of natural killer cells in 1,4 times in both groups in the acute stage.

2. FIC with concomitant ENT pathology detected signs disimmunoglobulinemia with higher levels of IgG indicating the long antigenemia and chronic intoxication, and a significant decrease in the concentration of IgA, IgM.

3. A significant decrease in the level of IL-1 $\beta$  in the acute stage, the FIC, while in remission on the contrary increase that is more than 2 times in comparison with a group of RIC. The level of IL-4 and TNF $\alpha$  in FIC during exacerbation episodes was significantly increased. Progressive dynamics up concentration IL-4, TNF $\alpha$  in the blood serum of FIC acute stage primary pathological process associated with a more pronounced influence of the exposure to frequent and complicated process infectious relapse episodes of upper respiratory tract for a pro-longed time.

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## Optimization of the surgical tactics in difficult localizations of vascular injury consequences

**Abstract:** The study of problem shows that for today such aspects as clinical picture, diagnosis, methods of surgical treatment and their consequences in the difficult localization of vascular injuries (aneurisms and fistulas) have been studied insufficiently well. We performed 45 surgeries in patients with TAA and TAVF. Of them 28 (62,2%) patients with TAA; 17 (37,7%) patients with TAVF. Before their admission to our center they were performed primary surgical debridement (PSD) of the wounds in the regional hospitals. The examination of the patients showed that there was not kept up alertness in relation to injuries of the main vessels; activity of surgical tactics in treatment of bleedings; in performance of more careful revision of the wound canal in order to achieve complete hemostasis.

In each concrete case the tactics of surgical treatment depends on, first of all, the accuracy of preoperative diagnosis including data of angiography, multispiral computed tomography (MSCT). On the basis of data obtained there was reliably revealed localization of fistulas and aneurisms, their types, forms, anatomic and technical conditions for carrying out various kinds of vessel reconstructions. The surgeon need in improvement of the knowledge and experience of liquidation of complex difficult for access of the injuries of vessels as well as special learning for performance of surgical restoration or reconstruction of the vascular injury consequences. The purpose of this article is diagnosis and optimization of the surgical treatment of TAA, TAVF in difficult to access localization.

**Keywords:** vascular injury, traumatic arterial aneurysm (TAA), traumatic arterio-venous fistula (TAVF), difficult localization, diagnosis, surgery.

### Introduction

Recent years are characterized by a sharp increase in the number of injuries involving damage of the main vessels. Surgical treatment of traumatic vascular injuries and their effects has a long history. Despite this, some questions are still not solved and require further elaboration. Diagnosis and surgical treatment of traumatic vascular injuries is an actual problem of modern angiosurgery. This is confirmed by studies of this problem a number of domestic and foreign scientists, which underline the feasibility of further development of technologies of diagnostics and principles of optimization of surgical treatment of traumatic vascular lesions [3; 4; 6; 7; 8; 9; 10; 11]. In such injuries mortality reaches up to 15.4–25.5%, and primary amputation is performed to 17.3% of patients, after reconstructive operations from 9.6 to 12.2% [2; 5]. If the damage of large arterial and venous vessels mortality is 10–56%. According to the Koroleva M. P. and others the mortality rate is 25.3% (2011). The wound of the great vessels of the neck is among the severe kinds of injuries. To date, their complications remains complex and poorly solved problem in terms of diagnosis and treatment. In this regard, the unsatisfactory results of treatment, reaching up to 27–75%. For injuries of the neck injuries of the vessels occur in approximately 25% of cases. Most patients go to the district hospital where surgery is 63.1% of

them, to specialized departments of vascular surgery reaches only 6.1% of the victims. In this regard, there is a large number of organizational, diagnostic, tactical and technical errors that in some situations leads to disability and even death of patients.

It is pertinent to note that late diagnosis and improper surgical treatment of traumatic vascular injuries lead to death or development of severe complications, ending with a disabilities [1; 7]. In the last decades in Uzbekistan and in the world has increased the demands on the diagnosis and surgical treatment of vascular injuries and their consequences. In this regard, before the health care system and its specialized research centers tasked with developing effective methods of diagnosis and optimization of methods of surgical treatment of traumatic damages vessels.

The analysis of practical materials for the studied problem shows that to date insufficiently studied: clinic, diagnostics, methods of surgical treatment and their consequences, in remote localizations of vascular damage (aneurysmal and fistulas).

### Material and methods

In the clinic under our supervision there were 48 patients regarding traumatic arterial aneurysmal (TAA) and traumatic arteriovenous fistulas (TAVF), with hard-to-reach localization. Causes TAA and TAVF are presented in table 1.

Table 1. – The causes of TAA and TAVF

№	Causes of TAA and TAVF	All patients	%
1.	Piercing–cutting weapons	24	50%
2.	Gunshot wounds (bullet, shot)	5	10,4%
3.	Car accident	2	4,1%
4.	Blunt trauma	5	10,4%
5.	Iatrogenic injury	5	10,4%
6.	Other	7	14,5%
	Total:	48	100,0

Analysis of patients with TAA and TAVF by age and sex (men – 40 (85,1%), women – 7 (14,8%)) are presented in table 2.

Table 2. – Distribution of patients according to sex and age

Age of the patients	Including		Quantity of patients%
	Men	Women	
Till 15 years	6	3	9 (18,7%)
16–20 years	4	–	4 (8,3%)
21–30 years	12	1	13 (27%)
31–40 years	9	–	9 (18,7%)
41–50 years	4	3	7 (14,5%)
51 years or more	6	–	6 (12,5%)
Total:	41 (85,4%)	7 (14,5%)	48 (100%)

In most cases, TAA was observed in men of active working age from 15 to 40 years.

In table 3, we present the distribution of the patients with TAA and TAVF, depending on localization and defeat of arteries.

Table 3. – Localization TAA and TAVF

Body parts	Localization TAA	Localization TAVF	Quantity of patients%
Neck and head	Carotid artery – 2 Spinal artery – 1	4	7 (14,5%)
Trunk	Subclavian artery – 8		8 (16,6%)
Lower limb	Femoral artery – 17 Popliteal artery – 3	9 4	26 (54,1%) 7 (14,5%)
Total:	31 (65,9%)	17 (34%)	48 (100%)

We present the distribution of the patients with TAA and TAVF, depending on localization and defeat of arteries.

The most frequent localization TAA and TAVF was observed in the femoral artery and 26 (54,1%); subclavian artery — 8 (16,6%); popliteal artery — 7 (14,5 percent).

Local pain observed in the field TAA and TAVF, i. e. the pulsating

swelling — 35 (74.4%). Severe pain in the formation of TAA and TAVF, that observed due to ischemia, compression and imbibition blood to neighboring tissues, including nerves. These pains subside or may pass with reduced edema, hemorrhagic infiltration and resorption of the organization of the walls TAA and TAVF. On duration of existence, terms traumatic aneurysms and TAVF are presented in table 4.

Table 4. –Duration of traumatic arterial aneurysms and TAVF

Duration of TAA and TAVF	Quantity of patients	Operated
Till 5 months	35	34
Till 1 year	3	2
2–3 years	2	2
4–5 years	5	5
6–9 years	–	–
10 years or more	3	2
Total:	48	45

In the diagnosis of these pathologies, we drew attention to the presence of: tumours of education and its dimensions, systolic murmur and shake over the affected area. In this case, is made of: body sphygmography, 5 patients with a sharp decrease in the amplitude of the foot and lower third of the leg; angiography — 15 patients, the size of education ranged from 2x2. 5 to 3x3,5 cm; ultrasound 21 patients, education of sizes 1,1x1,6 cm to 6,4x3,2 cm; Doppler — 8; MSCT study — 4 patients: with the right ILCD 0.8 to 1.4, to the left of 1.1 to 1.5 (0.9 to 1.2 normal).

### Results and discussion

The surgical method remains to the main things, in treatment traumatic arteriovenous fistulas and aneurysms. Currently there are proposed many methods of correction this pathology. However, surgical treatment remains one of the most effective method in surgery of traumatic arteriovenous fistulas and aneurysms. Difficulties in treatment are associated with complex post–traumatic formations aneurismal and formation of rough scars in the neurovascular bundle region. Term and character of operations in TAA and TAVF are presented in table 5.

Table 5. – Term and character of operations at TAA and TAVF

Duration of TAA and TAVF	Ligature	Extratopical bypass grafting	Side seam	Circular seam	Autovenous bypass grafting	Prosthetics	Patch	Total
Till 5 months	13	1	7	4	7	2	1	34
Till 1 year	1						2	3
2–3 years	1		1					2
4–5 years			1	1				2
6–9 years								
10 years or more			2	1				3
Total:	15 (33,3%)	1 (2,2%)	11 (24,4%)	6 (13,3%)	7 (15,5%)	2 (4,4%)	3 (6,6%)	45 (100%)

All of us produced 45 surgeries for patients with TAA and TAVF. Of them: there were 28 (62,2%) patients with TAA, and 17 (37,7%) patients with TAVF. Before admission to our regional hospitals, patients made primary surgical treatment (PST) wound. Is not complied with increased vigilance in respect of injuries of the great vessels, the activity of the surgical treatment of bleeding manifested not carried out a more thorough audit of the wound channel, to achieve complete hemostasis. In each case surgical treatment depends primarily on the accuracy of preoperative diagnosis, including angiography, multislice computed tomography (MSCT). Based on the obtained data, reliably learned the localization of the fistulas and aneurysms, their types, forms, anatomical and technical conditions for the possibility of performing different kind of reconstruction of the vessels.

Ligature surgery of the arteries was performed on 15 patients, including subclavian — 4; femoral — 6; popliteal — 1; carotid — 3; spinal — 1. At the same time, were taken into account: the results of MSCT; aneurysmal widening of the artery; when severe tortuosity length from 2.5 to 4 cm, carried out the resection of an aneurysm of the artery and its distal bandaged and stitched. For example, in one case intraoperatively common femoral artery (CFA) cover formation, stony density to 3cm, coming from the mouth of the deep femoral artery of the thigh in the form of the coupling, up to 1 cm within. Opened a cavity about the thrombosed aneurysm, right femoral artery and produced by ligation of the femoral artery and vein. In another case of abscess of denture and arrosive bleeding, rupture of the back wall of the aneurysm in the retroperitoneal space produced by the removal of the prosthesis and tied with VCI and CFA. In difficult scarring processes the arteries were not allocated, performed

ligation of the external carotid artery (ECA). 2 patients had AVF: 1 — fistula between the ICA and the IJV defect vein 0,4x0,7 cm, in which blood loss was 1 liter; 1 patient pronounced scar between the external carotid artery and internal jugular vein (IJV) it was decided to produce ligation of IJV. Bleeding from vertebral artery injuries are frequently observed from the vertebral artery between the third and fourth vertebrae. In such situations, the wound hole under pressure introduced wax mixture with a hemostatic sponge. Bleeding from the vertebral artery is stopped by suturing. Further, to strengthen the aneurysm, a second layer of sternocleidomastoid muscle to flash to the spinal muscles. Given the retrograde pulsation posterior tibial artery (PTA) and good ripple anterior tibial artery (ATA), PTA bandaged. In 1 patient the defect in the wall of the subclavian artery massive adhesions and there was intensive arterial bleeding from the subclavian artery, it was decided to ligate the subclavian artery. In 1 patient with significant difficulties (shifted profusely bleeding) exposed IJV and common carotid artery (CCA) at the base of the skull. In 1 patient, with a defect of the anterior wall of the artery with a size of 4 cm, noted the technical difficulties associated with the allocation of the second segment of the subclavian artery expressed adhesions involving the aneurysmal process, the reconstruction of the vessels in this case were unsuitable. In this regard, the arteries with aneurismatic bag was stitched and bandaged. Mouth thyroid and internal mammary artery, stitched and bandaged, too. Despite this, it was noted the pulsation of the aneurysm wall, overhanging the thoracic cavity. After that, the carotid artery is isolated and 3 segments of the subclavian artery, superimposed carotid–subclavian autovenous bypass grafting.



Figure 1. The stab–slash wound in the area of the neck

Side seam imposed in 11 patients. Thus, in 7 patients, lateral suture of the femoral artery, and 2 cases of lateral suture femoral vein, 1 patient, simultaneously imposed lateral suture arteries and veins, traumatic arteriovenous fistula of the size of defect from 0,3x0,2 cm to 3cm long. One else patients was applied the lateral suture on the defect of aortic arch and anonymous vein after fistula isolation.

The use of optimized surgical tactics and therapeutic technique allowed differentiation of the anatomic masses involving into the process and performance of surgery at more qualitative level. On the basis of clinical symptomatology, angiography and MSCT there was made diagnosis: posttraumatic aorta-venous fistula on the left side of neck. The patient was made operation of ABC division between aorta arch and anonymous vein.

Because the fistula located at the level of aortic arch and anonymous vein during operation there were occurred significant technical complexities and danger of profuse bleeding. In this connection the AIK of the common femur artery and vein was connected for reduction of arterial pressure to 70 mm Hg. The heparin 5000 un. was injected. Then sternotomy was performed. During isolation of arch of ascending aorta there was found damage of the anonymous vein and aortic arch where aorta-venous fistula was between them. For fistula isolation there was inserted clamp between the anonymous vein and aortic arch. The side suture was made on the posterior wall between anonymous vein and aortic arch with prolan thread 5/0. ABC of the fistula was connected by double-row suture and was fixed with pericardial and periaortal purse-string suture. (Fig. 1-6).

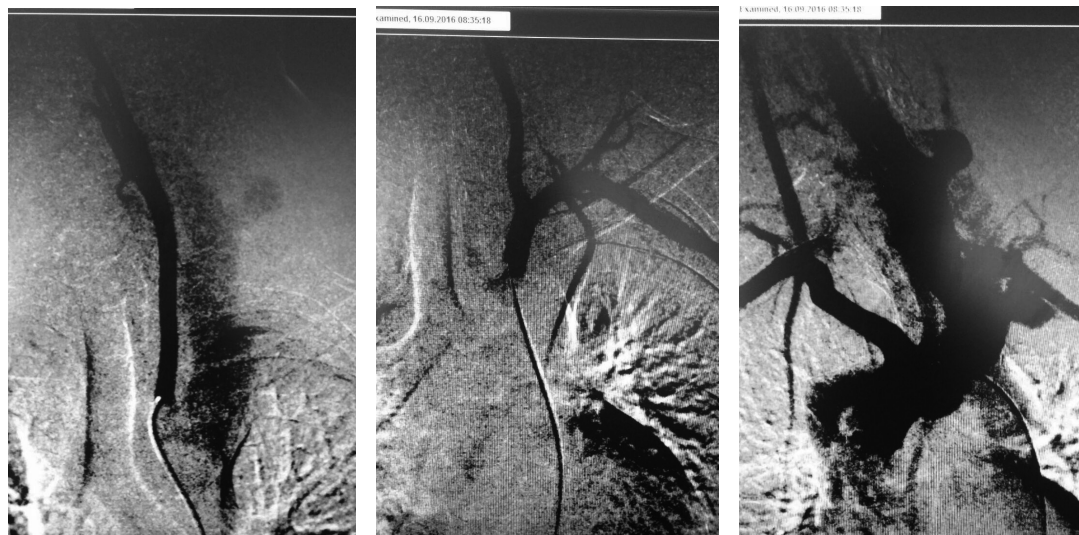


Figure 2. Angiography of TAVF on the aortic arch and anonymous vein



Figure 3. MSCT of the aortic arch and vein in the neck

Under control ultrasound investigation there was noted decrease in linear velocity in the aortic arch and absence of systolic-diastolic flow. The patient was discharged under satisfactory condition with restoration of active movements in the extremities. During examination the systolic tremor and murmur were absent.

The following cases reports confirm this approach.

Patient K.A. of 30-year-old, Medical History N5657 of 13.09.2016. Complaints: presence of mass on the left side of neck after knife wound.

Objectively: The general state of the patient at admission was satisfactory. The skin and visible mucous integuments were clean, of normal color. The osseous-articular system was without visible

deformations. Auscultation showed vesicular respiration in the lungs, rale were absent. The heart sounds were clear, rhythmic. AP 120/70 mm Hg on the both hands, pulse 74 beats/min. The abdomen had normal form, participated in respiration, at palpation it was soft, tenderless. Stool and urination were normal.

Locally: At examination there was found mass on the left of neck, sizes 15x3.0 cm, at palpation tender and movable. The skin was not changed above the mass. There was noted asymmetry of the left side of neck. There was also noted vein dilatation in the area of the chest and abdomen. Under palpation there was found tremor.

Pulsation was determined on all marking points. The murmur were absent under main arteries.

Examination: WBC- $6,6 \pm 10,9/L$ . Neu 46,7%; Lym 38,9%, Mon 12,8%; Eos 1,1%; Bas 0,5%; RBC - $5,3 \pm 10,12/L$ ; HGB — 164 g/l; HCT 49,3; MCV 92,9 L; MCH 30,9 Pg; MCHC 333 g/l; RDW-CV 11,6%; RDW-SD 41,4 L; PLT  $237 \pm 10,9/L$ ; MPV 8,9 fL; PDW 16; PCT 0,21%. General Urine Analysis — protein — neg., epith. — 0-0-1/%. Leucocytes 0-0-1/%.

Biochemical Blood Analysis: Glucose — 5,1 mmol/l; Urea- 4,3 mmol/l; Creatinine 66 umol/l; Na+ (sodium) 142; K+4,7 (potassium); Total protein 78 g/l; AST 25u/l; ALT 37 u/l; Total bili.

18 umol/l; Conj.bili. 0. Ht — 44%. PTI 72%. HbsAg — neg. Anti HCV (hepatitis -C) — neg.

Roentgenoscopy: Lung fields were without free focal and infiltrative shadows. The roots were cord. Sinuses are free. The heart was lying broadly on the cupula of diaphragm, enlarged in diameter. The aorta was sclerosal unrolled, protruded. ECG: sinus rhythm, heart rate — 90. LVH. Metabolic changes in the myocardium. EchoCG EDV 186 ml, ESV 131 ml, SV 115 ml, output fraction 62%.



Figure 4. Interoperation picture. AIC of femoral artery and vein

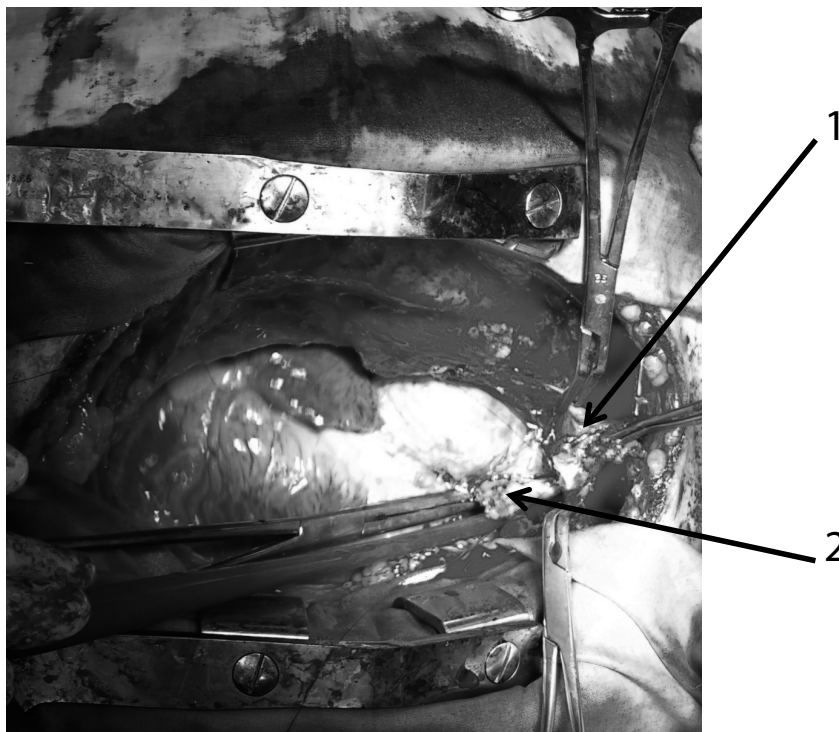


Figure 5. Application of clamps between fistula of aortic arch (2) and anonymous vein (1)



Figure 6. Isolation of fistula between aortic arch and anonymous vein and application of the lateral suture on the defect of aortic arch and anonymous vein

Under the local anesthesia into the femur arteries bilaterally there were established introducers 6F. There was performed roentgenovascular temporary complete balloon occlusion of the arterial vessels. There was used balloon catheter of sizes 6x60 mm; For dilatation to the complete occlusion and vessels patency. Occlusion occurred at pressure in the balloon to 9 atm in RBP 10 atm. Contrast Yunigeksol-350-100 ml (1 bottle per 100ml). There were injected 3 thous. MED heparin (Fig.7).

Circular seam superimposed 6 patients, including 2 patients superficial femoral artery (SFA). 1 patient simultaneously produced: a circular seam and lumbar sympathectomy, catheterization of the

epigastric artery to the left, when beginning suppuration of the toes. 2 patients superimposed circular seam of the femoral artery and the lateral suture of the femoral vein. The defect of the femoral artery was 1 to 2 cm in 1 patient, superimposed circular seam of the popliteal artery. In case of big defects (3x1, 2x2 cm) arising in the course of operations performed in 3 patients patch from autovein, 1 patient was performed simultaneously patch the femoral artery and vein, 1 with defect (1,0x0,5 cm), patch the femoral artery, 1 case of inflammation of the walls (defect up to 1 cm) of the artery, it was impossible to select it, had to patch the popliteal artery.



Figure 7. Endovascular temporary total occlusion of the vessels

7 patients underwent autovenous bypass grafting. In marked infiltration of the tissues in the region of aneurysms and arrosive bleeding, 3 patients produced femoral–popliteal autovenous bypass grafting. 1 patient with a defect of the anterior and posterior walls of the femoral artery size from 1.5 to 2 cm at the same time imposed autovenous patch. The start of blood flow preserved systolic trembling on the femoral vein. In this regard, made autovenous bypass grafting. 1 patient superimposed atypical femoral–popliteal bypass. In 1 patient with a defect of the artery, with TAVF up to 2 cm, made autovenous bypass of the right femoral artery and femoral vein patch. In aneurysmal sack dimensions up to 6x6 cm, with thick infiltrated walls, made common femoral–deep femoral autovenous bypass grafting. In 1 patient with a large defect in the wall of the common femoral artery superimposed autovenous bypass surgery of the common femoral artery. Another patient was made resection of SFA and VCI and imposed atypical iliac–femoral allovenous bypass through the muscular lacuna. After 2 months his from the distal anastomosis was observed arrosive bleeding and were bleeding is stopped by suturing iliac–femoral bypass and SFA.

A synthetic prosthesis is made in 2 patients: a defect in the iliac artery up to 4cm, made the prosthetics of the common iliac arteries, by prosthesis 10 mm (B. Braun). When the festering wound in the middle third of the thigh and arrosive bleeding with hemorrhagic shock of the second degree, also with a defect of the femoral artery to 3 cm, were produced atypical iliac–superficial femoral arterial prosthesis.

In our study, 6 patients at the same time, the observed aneurysms and arteriovenous fistulae. For certain categories of patients, was carried out high–tech hybrid operation. Previously, when choosing access and tactics of surgical treatment of the aneurysm subclavian artery, was necessary to break the clavicle. Currently, use hybrid technology. In particular endovascular temporary total occlusion of the vessels and endoprosthesis. Basically, these methods were used in TAA subclavian artery.

In the postoperative period, a complication was observed the following: arrosive bleeding — 3, hemorrhagic shock — 1, festering wounds — 2, limb ischemia — I A grade — 1, hemorrhagic anemia — 1, thrombosis of the popliteal artery — 1.

#### Conclusions

1. When TAVF and TAA tactics of surgical treatment should be divided into 3 stages: The first stage — full temporary endovascular occlusion of blood vessels. The second stage is the separation arteriovenous fistula angioplasty. Third stage — the elimination and reconstruction of the aneurysm;

2. Temporary occlusion of the vessels of the arterial tributaries is an important point in the treatment of patients with traumatic aneurysms and arteriovenous fistulas. This leads to reducing the volume of operative blood loss, reduced time and duration of operations, as well as tactical and technical errors. All of these techniques and methods positively influence the results of surgical treatment of TAA and TAVF.

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## Polymorphisms (rs1048943) (1799853) (rs 2740574) of CYP1 A1, CYP2 C9, CYP3 A4 genes at Uzbek population

**Abstract:** Clinically important genes CYP1 A1, CYP2 C9, CYP3 A4 were studied for the first time in Uzbek population, for 217 healthy voluntaries. The frequencies of minor alleles CYP1 A1\*2 C, CYP2 C9\*2, CYP3 A4\*1 B were 6,7, 9,4, and 3,2% respectively and corresponded to Caucasian. For 3 alleles the genotype frequencies were in accordance with Hardy–Weinberg equilibrium. The absence of homozygous CYP1 A1\*2 C, CYP2 C9\*2, CYP3 A4\*1 B was revealed. 86,6, 81,1, and 93,5% were homozygous for wild alleles, 13,4, 18,9 и 6,5% were heterozygotes CYP1 A1\*2 C, CYP2 C9\*2, CYP3 A4\*1 B respectively. The intermediate surplus of observed heterozygotes on expected heterozygotes was shown for CYP1 A1\*2 C, CYP2 C9\*2.

**Keywords:** polymorphism, CYP1 A1, CYP2 C9, CYP3 A4, Uzbek population.

**Introduction.** Clinical significant CYP1 A1, CYP2 C9, CYP3 A4 genes have been first studied at the Uzbek population in samples of 217 healthy volunteers. Minor CYP1 A1\*2 C, CYP2 C9\*2, CYP3 A4\*1 B alleles frequency was 6,7,9,4 and 32% respectively, which is typical to representatives of European ethnicity. Genotypes distribution by three polymorphic variants comply Hardy Weinberg principle on equilibrium. The absence of CYP1 A1\*2 C, CYP2 C9\*2, CYP3 A4\*1 B alleles' homozygote has been detected, homozygotes of wild type accounted 86.6, 81.1 and 93.5%, heterozygote-13.4, 18.9 и 6.5% respectively. There is a moderate excess of detected heterozygotes with respect to expected ones for CYP1 A1\*2 C, CYP2 C9\*2 shown.

The human body constantly has to cope with the huge flow of drugs, artificial chemicals, food additives and preservatives in addition to natural substances produced by plants, fungi, bacteria and other organisms. These low molecular weight species, LMWS — «xenobiotic» is neutralized in the cells of various organs and tissues by host-mediated assay system. P450 super family available in the liver, lungs and intestinal canal, kidney, brain, uterine cake, mucous coat of epic pharynx, and skin at cet. Performs 95% of all reactions of biotransformation wherein the most significant biocatalysts are CYP1 A1, CYP2 C9, CYP3 A4 involved in 7.9 and 20% of metabolism [1]. Changes of these and other biocatalysts of neutralization caused by polymorphism of encoding gene impacts on different medication pharmacokinetics, severity of adverse effect as well as trigger the progression of oncological diseases

due to the accumulation of inter current carcinogenic products [2].

In this regard the objective of the present research worksite study the development (extension) of main polymorphic variants of CYP1 A1, CYP2 C9, CYP3 A4 at Uzbek population.

**The aim of the study.** Determine (rs1048943) rs (1799853) (rs 2740574) polymorphism frequency of CYP1A1, CYP2C9, CYP3A4 gene at Uzbek population.

**Materials and methods.** The research Institute of Hematology and blood transfusion Ministry of health care of Uzbekistan. Department of molecular medicine and cell technologies investigated sample DNA 434 unrelated chromosomes Uzbeks, one of the most numerous indigenous peoples of Uzbekistan. Work done on DNA samples isolated from peripheral blood. Extraction of DNA from whole blood was performed using standard sets of RIBO-Sorb (AmpliSens®, Russia). The concentration and purity of the purified DNA was determined by the apparatus of NanoDrop 2000 (USA). Genotyping of the polymorphic variant CYP1 A1 CYP2C9, CYP3A4 gene was performed by standard PCR. Testing was conducted on a programmable thermal cyclor of «Applied Biosystems» company (USA) using the test-kit of «Litech» company (Russia) according to manufacturer's instructions. Statistical analysis of the results was carried out using statistical software package «2009 Open Epi, Version 2.3».

Findings and discussions

Basic information on the polymorphic variants of the genes studied is presented in the Table 1.

Table 1. – General information about CYP1A1, CYP2C9, CYP3 A4 polymorphic alleles

CYP1A1*2 C (rs1048943)	CYP2C9*2 (rs 1799853)	CYP3 A4*1B (1A/1B) (rs 2740574)
Genelocalisation at chromosome. Mutation		
15q24.1 Replacement of 2455A>G At 7 exon	10q23.33 Replacement of 430 C>T At 3 exon	7q22.1 Replacement of –392A>G at 5' regulatory site
Substitution at the enzyme. Assumed (estimated) changes in enzyme activity.		
Replacement of isoleucine to amino isovaleric acid at 462 codon, Ile462Val Increment in activity	Replacement of arginine to cysteine at 144 codon. Arg144Cys Decrease in activity	– Upregulation

The study of CYP1A1\*2 C, CYP2C9\*2, CYP3A4\*1 B genes polymorphism frequency at the Uzbek population has been conducted on

434 non-relative chromosomes (217 from the volunteers). According to the frequency of alleles is 6.7, 9.4 and 3.2% respectively (table 2).

Table 2. – Distribution of alleles and genotypes by three polymorphisms at Uzbek population

Title	CYP1A1*2 C	CYP2C9*2	CYP3A4*1B
Minor allele frequency	6.7%	9.4%	3.2%
Genotyping assay by minor allele			
Homozygote wt/wt, n (%)	188 (86.6%)	176 (81.1%)	203 (93.5%)
Heterozygote wt/m, n (%)	29 (13.4%)	41 (18/9%)	14 (6.5%)
Homozygote m/m, n (%)	0 (0%)	0 (0%)	0 (0%)
Compliant to ERW	$\chi^2=1,11, P=0,29$	$\chi^2=2,36, P=0,1$	$\chi^2=0,24, P=0,62$
D*	+0.08	+0.1	+0.03

Note: D\* is the index of the relative deviation of the observed heterozygosity from the expected one, wt — wild allele, m — the mutant allele

Distribution of genotypes by three polymorphic variants complies ERW, wherein absence of homozygotes for 3 mutant alleles was detected, that is typical at the low frequency of alleles in population. Homozygotes for 3 alleles of CYP1A1, CYP2C9, CYP3A4 genes amount 86.6, 81.1 and 93.5%, heterozygotes — 13.4, 18.9 and 6.5% respectively. Indices related to deviation of observed heterozygosity from expected (D\*) one for 3 alleles denote low level of inbreeding at Uzbek population, as well as moderate excess

of heterozygote for CYP1A1\*2 C, CYP2C9\*2 is detected.

According to investigations of haplotypes of m DNA and Y chromosome [3; 4]. Uzbek population has more than half of the Caucasoid, less than half of Mongoloid and small quantity of Austro-Asiatic roots. Therefore findings received further were compared with indices of minor alleles frequency at the Caucasoid and Mongoloids, significantly differ from each other by many indices (table 4).

Table 3. – Distribution of alleles studied in other ethnic groups

	CYP1A1*2 C	CYP2C9*2	CYP3A4*1B
Caucasians	5,0–13,0% [5; 6]	10,0–15,0% [7]	3,0–10,0% [8]
Mongoloids	~25% [6]	0–3% [7]	0% [9]
Ethnically close population			
Tadjiks (China)		0% [10]	1,5% [10]
Iranians	10% [11]	12,0% [12]	0% [13]
the Uigurs (China)		7,8% [14]	

As expected, the allele frequency of CYP1A1\*2 C, CYP2C9\*2, CYP3A4\*1 B at the Uzbek population complies the rates (indices) of the Caucasians. This finding can be later applied in advancing personalized medicine and cancer diseases prevention in Uzbekistan.

#### Conclusions

1. Minor CYP1A1\*2 C, CYP2C9\*2, CYP3A4\*1 B alleles frequency was 6.7, 9.4 and 3.2% respectively, which is typical to representatives of European ethnicity (Caucasoid).

2. Genotypes distribution by three polymorphic variants complied Hardy Weinberg principle on equilibrium.

3. The absence of CYP1A1\*2 C, CYP2C9\*2, CYP3A4\*1 B alleles' homozygote has been detected, homozygotes of wild type accounted 86.6, 81.1 and 93.5%, heterozygote- 13.4, 18.9 and 6.5% respectively.

4. There is a moderate excess of detected heterozygote with respect to expected ones for CYP1A1\*2 C, CYP2C9\*2 shown.

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## Current state of the problem sudden infant death at home

**Abstract:** The “Sudden Infant Death Syndrome” stands for unexpected nonviolent death of apparently healthy chest age child when there is no history or pathomorphological features which can be adequate explanations for death reasons. In Russian Federation, the death rate from this syndrome in the range of 0,06 to 2,8 per 1000 live births. In Stavropol region, average figures are equal to 0,36 per 1000 live births in the period of 2005–2014. Rates of incidence sudden infant death syndrome are similar to the rates of incidence associated with infectious diseases, and as a result of injury or poisoning. Currently paid attention to neurogenic mechanisms of sudden infant death syndrome, as a consequence in combination cranio-spinal birth injury with delayed fatal in infancy, in the period of residual effects.

**Keywords:** sudden infant death syndrome, cranio-spinal birth injury, a heterogeneous phenomenon, genetic disorders, immunological and endocrine failure.

**Introduction.** Throughout human history there are descriptions of sudden infants death. Despite the fact that the first one can be found in the Bible, in the king Solomon court scene, today this problem has not lost its acuity and relevance. According to the definition adopted at the second International Conference on sudden infant death (1970), “sudden infant death syndrome (SIDS) is understood as an unexpected non-violent death of an apparently healthy infant, when there are no data of the anamnesis and a patho-anatomical research, adequate for an explanation” [1].

Patho- and morphogenesis of sudden infant death syndrome are a subject of a continuing discussion of clinical physicians and pathomorphologists. Some researchers deny the existence of SIDS, others consider it as a heterogeneous phenomenon developing as a result of genetic disorders or immuno-endocrine insufficiency. It is accepted to distinguish two types according to the mechanism: respiratory and cardiac teratogenesis [2; 3; 4; 5; 6; 7; 18; 22; 23].

It should be noted that pediatricians place emphasis on the presence of neurologic symptomatology at 20–25% of all newborns [8; 9]. Many authors described the clinical manifestations preceding the sudden death of children of the first year of life, which speak of neurologic deficiency and autonomic deregulation. These include: vomiting and choking during feeding or within 30 min after it; apnea; signs of imbalance of the sympathetic system in various sleep phases; hypertonicity of the muscles and hypotension combined with abnormal movements of the body; regurgitation, diaphoresis, hypothermia, transient bradycardia. A number of researchers call the above-stated clinical manifestations life-threatening factors that may have a neurogenic origin, and arise as consequences of a birth trauma of the central and parasympathetic nervous systems [10; 11; 12; 13].

In the majority of industrialized countries the frequency of SIDS makes 0,6–2,0 on 1000 live births [4]. Today the lowest mortality rate from this syndrome is in Japan — 0,09 per 1000 live

births. In New Zealand the highest rates of mortality are recorded — 0,80 per 1000 live births [14]. Mortality from SIDS is presented in the USA by the intermediate values and makes 0,69 on 1000 live-born [24].

In the Russian Federation the mortality rate from this syndrome is ranging from 0,06 to 2,8 on 1000 travailled live [15]. In the large cities the frequency of SIDS approaches the developed countries. Vorontsov I.M. with the coauthor (1997) gives SIDS frequency in St. Petersburg: on average over 10 years it is 0.47 per 1000 live births, which is consistent with the data in Italy. The frequency of SIDS in Moscow is 0,40–0,45 per 1000 live births, similar data are brought across Volga region. The highest mortality rates of SIDS (from 1.06 to 2.8 per 1,000 live births) is characteristic of Orel region, Republic of Dagestan, Republic of Altai and Buryatia, Arkhangelsk, Murmansk, Novosibirsk, Kursk and Kaliningrad regions. Udmurdsкая Republic, Ryazan, Rostov, Volgograd, Samara,

Bryansk region are marked by a low mortality from sudden infant death syndrome [4].

*The object of the study:* to ascertain the frequency of sudden infant death syndrome in Stavropol region and to determine a ratio of this syndrome with other causes of infant death.

*Research material and methods:* we conducted a retrospective study on SIDS frequency in Stavropol region for the period 2005–2014. Statistical data were provided by the local authority of government statistics — SBHI of Stavropol region “Medical information-analytical centre”. Materials for detailed study were forms of medical death certificates.

*Results overview.* Table 1 reflects SIDS frequency in Stavropol region. Average values for 2005–2014 made 0,36 on 1000 children who were born live. The highest frequency of 0,53 per 1000 was registered in 2012 and the lowest was observed in 2007 (0,23 per 1000).

Table 1. – SIDS frequency in Stavropol region

Year	Number of live births	Number of SIDS cases	SIDS frequency per 1000 live births
2005	27 251	13	0,48
2006	27 429	9	0,33
2007	30 642	7	0,23
2008	33 007	8	0,24
2009	32 823	15	0,46
2010	33 067	11	0,33
2011	32 861	8	0,24
2012	26 384	14	0,53
2013	27 759	10	0,36
2014	27 970	10	0,35
Total:	299 193	105	0,36

The analysis of 105 cases of SIDS showed that among the dead boys made 62,86% (66), girls of 37,14% (39). In rural areas the number of dead children is 69 (65,71%), in the cities and the regional centers — 36 (34,28%). On the basis of the research seasonality was marked, the highest number of children died in February. In

general children aged up to 5 months 29 days prevailed — 91 (that corresponded to 86,7%), and the number of deaths up to 1 year equaled 95,2%.

Table 2 reflects the structure of infant mortality in Stavropol region for the period 2005–2014.

Table 2. – Causes of infant mortality in Stavropol region (per 1000 live births)

Year	Common IM	IM	Congenital anomalies	Respiratory diseases (including pneumonia)	Infections	Sudden death	Injuries and poisoning
2005	11,1	5,39	2,60	1,14 (0,77)	0,40	0,48	0,33
2006	10,1	4,01	2,22	0,98 (0,80)	0,22	0,33	0,47
2007	8,5	4,72	0,19	0,88 (0,82)	0,16	0,23	0,16
2008	9,6	4,58	2,55	0,88 (0,76)	0,18	0,24	0,45
2009	9,7	5,79	1,55	0,73 (0,43)	0,27	0,46	0,64
2010	8,5	5,44	1,21	0,48 (0,45)	0,36	0,33	0,39
2011	8,6	5,69	1,37	0,64 (0,51)	0,27	0,24	0,21
2012	8,6	5,34	1,67	0,74 (0,55)	0,34	0,53	0,45
2013	8,4	5,34	1,76	0,64 (0,75)	0,28	0,36	0,41
2014	8,2	5,25	1,57	0,56 (0,63)	0,26	0,35	0,46

Note: IM – infant mortality, PS – perinatal condition.

The infant mortality rate declined in 2014, it made 8,2 cases per 1000 live births. The main number of fatal outcomes now account for the early neonatal period (0 to 7 days of life). In the structure of infant mortality in 2014 diseases of perinatal period ranks first (52,5%), in second place — congenital anomalies (15,7%).

A significant share of infant mortality is sudden infant death syndrome. Rates of sudden infant death syndrome cases are close to

the rates of cases associated with infectious diseases, and as a result of injury or poisoning.

On the basis of modern native and foreign literature analysis the following morphological criteria for the diagnosis of SIDS can be distinguished. Children died of SIDS generally reveal signs of acute death: abundance of a livor mortis, liquid state of blood, hyperemia of the internal organs, edema and areas of atelectasis, emphysemas in

lungs, cerebral edema, multiple petechial hemorrhages in the serous and mucous membranes. The following pathological changes are constantly met — hyperplasia of medium and small caliber blood vessels muscular layer in the pulmonary circulation; hypertrophy of the right ventricular wall of the heart; brainstem gliosis; the excessive number of periadrenal brown fat; foci of extramedullary haematopoiesis in liver; thymus and lymphatic nodes hyperplasia of different localization; adrenal glands hypoplasia [14, 5]. Certain authors point to existence of dysplastic-dystrophic changes in the heart, lungs, liver, kidney, adrenal glands and regard them as the evidence of the long-lived hidden impact of hypoxia on children who died from SIDS.

It should be mentioned that the majority of morphological works on sudden death of infants of a chest age are often hypothetical and descriptive. Today they are supplemented with data from biochemical, genetic, immunohistochemical and immunofluorescence studies [18; 19; 20; 21; 22; 23; 24; 25]. In this respect, fundamental and pathogenetically verified scientific work by Parilov S. L. (2009) attracts attention. The author described morphological characteristics of the transferred birth trauma in infants in the form of residual signs of damage to the skull, brain, spinal column and the parasympathetic nervous system [11; 12]. Considering Likhterman L. B. classification (2016), these changes can be referred to consequences of a cranial-spinal birth injury in the form of fabric, liquorodynamic and vascular components [16, 4–20]. At the same time they allow to prove the mechanism of

life-threatening conditions appearance (apnea, gastroesophageal reflux, transient cardiac arrhythmias). Parilov S. L. in his work claims that birth injuries of the central and parasympathetic nervous systems in children are absent or demonstrate clinical symptoms of inflammatory diseases poorly. Even if the symptoms are morphologically manifested in the vital organs, there is always a clinical picture of various damage degrees to the nervous system. In case of death of children, who have no damage to the nervous system, somatic diseases have a typical clinical and morphological picture. It should be recognized that pathological changes in central and parasympathetic nervous systems at the time of causing associated cranio-spinal birth injury in most cases have no death pattern, and represent the possible delayed lethal outcome at infantile age, in the period of the residual phenomena. In a continuation of this subject the researches on the biomechanism of a birth trauma of fetus by elective and emergency cesarean section are of interest [17].

**Conclusion.** Today the etiology of SIDS is considered as a set of multivariate features. There is no doubt in relevance of the syndrome as a manifestation of combined cranio-spinal birth injury with delayed infant deaths in the period of residual phenomena.

Prevention of SIDS is the important reserve of general infant mortality reduction and at-home mortality reduction in particular.

As preventive measures, such arrangements as optimization of antenatal care for mothers, improved obstetric benefits and postnatal care for children can be held.

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## Study of diastolic function in patients with Q-wave myocardial infarction

**Abstract:** The article presents data on the study of diastolic function in patients with Q-wave myocardial infarction. It has been found that the progression of left ventricular diastolic dysfunction in patients with Q-wave myocardial infarction is associated with a longer course of coronary heart disease and hypertension.

**Keywords:** diastolic dysfunction, myocardial infarction, heart rate variability.

Prediction of adverse remodeling of the left ventricle (LV) after acute myocardial infarction is an actual problem of modern cardiology. The necessity of studying left ventricular remodeling in patients with myocardial infarction due to the fact that this process is the basis of the formation and progression of heart failure, occurrence of threatening ventricular arrhythmias and sudden death [1; 2; 3]. Studies in recent years have shown that the presence of left ventricular diastolic dysfunction (LVDD) as one and/or more abnormal Doppler echocardiographic indices have significant prognostic value in patients with cardiovascular disease, which increases with the degree LVDD [4; 5].

**The aim** of this study was to evaluate left ventricular diastolic function in patients with acute myocardial infarction

**Materials and methods.** We examined 131 male patients with primary Q wave myocardial infarction, aged from 30 to 69 years ( $51.9 \pm 9.13$  years). The steady phase of acute myocardial infarction, treatment was carried out in accordance with recommendations for management of patients with myocardial infarction with ST-segment elevation and included thrombolytic therapy if indicated, early administration of beta-blockers, antiaggregants, anticoagulants, nitrates, lipid-lowering agents, ACE inhibitors, loop diuretics. Against the background of conducted therapy for acute myocardial infarction on the 10<sup>th</sup>–14<sup>th</sup> day, all patients underwent clinical examination, including casual examination, medical history, ECG in 12 standard leads, echocardiography. Echocardiography and

Doppler studies were performed on the machine «Sonoline Versa Pro» according to the standard procedure using the recommendations of the American Society of echocardiography.

The data were processed using the computer program Microsoft Excel, STATISTICA 6 and Biostat. The odds ratio (OR) and 95% confidence intervals (95% CIs) were calculated using logistic regression. The significance of differences was assessed using indicators of non-parametric  $\chi^2$  test (Pearson's test). Quantitative indicators are presented as  $M \pm SD$ . Correlation relationship was investigated by regression analysis and Spearman's rank correlation coefficient. Differences between groups were considered statistically significant at  $P < 0.05$ .

**Results and discussion.** Undoubtedly, with the progression of coronary heart disease character of diastole indicators, its function undergo complex changes associated with worsening of diastolic disorders, and development of adaptive hemodynamic reactions, acting through the increase in pressure in the left atrium and/or end-diastolic pressure of left ventricle and lead to the formation of different types of diastolic dysfunction: inadequate relaxation, pseudonormal and restrictive [6; 7; 8]. To assess the relationship of violations of left ventricular contractile function and LVDD the patients were divided into 2 groups (Table 1.): group with preserved left ventricular systolic function (ejection fraction  $\geq 50\%$ ) and group with reduced ejection fraction ( $< 50\%$ ).

Analysis of the prevalence of LVDD of various types showed that severe diastolic dysfunctions of left ventricle — pseudonormal

and restrictive types were significantly more frequent in patients with reduced left ventricular systolic function.

Table 1. – Prevalence of LVDD in groups of patients with different left ventricular contractility

Diastolic dysfunction	LVEF > 50%	LVEF < 50%	P
Inadequate relaxation	33/73 (45.2%)	40/73 (54.8%)	0.25
Pseudonormal	12/35 (34.3%)	23/35 (65.7%)	0.014
Restrictive	4/23 (17.4%)	19/23 (82.6%)	0.00001

All patients depending on the severity of LVDD were divided into 3 groups: I (n = 73) – with inadequate relaxation, II (n = 35) – with pseudonormal type, III (n = 23) – with restrictive type of filling.

Анализ Analysis of clinical and anamnestic indicators showed (Table 2.) that patients with severe LVDD were more likely to have anterior localization of MI (73.9% vs 39.7% and 65.7%, respectively, groups I and II). Hypertension history with almost the same frequency was found in all groups being compared, but it should be noted that its remoteness was significantly higher in

the groups with type III LVDD. Diabetes mellitus with reliable frequency prevailed in the group of patients with the restrictive type of LVDD (8.2%, 8.8% vs. 13%). The similar trend can be seen in relation to remoteness of coronary heart disease before MI. Thus, in the group with severe LVDD, it was 10.5 years versus 5.2 and 6.4 years in group I and II, respectively (p < 0.05). As worsening diastolic dysfunction it observed pronounced inhibition of left ventricular systolic function, characterized by reduced indicator of ejection fraction (EF) to  $37.2 \pm 10.14\%$  in patients with restrictive type of LVDD.

Table 2. – Comparative characteristics of groups with different types of LVDD

Indicators	Group I (n = 73)	Group II (n = 35)	Group III (n = 23)
Anterior	29/39.7% 23	23/65.7% *	17/73.9% **
Posterior	44/60.3%	12/34.3% *	6/26.1% **
GB	68/90.4%	26/74.2%	20/82.6%
DM	6/8.2%	3/8.8%	3/13% **, ***
EF, %	$49,3 \pm 10,27$	$44,3 \pm 8,56$	$37,2 \pm 10,14$ **, ***

\* – P < 0.05 between groups I and II

\*\* – P < 0.05 between groups II and III

\*\*\* – P < 0.05 between groups I and III

Identification and analysis of options for LVDD have important clinical value as indicate the severity of diastolic dysfunctions contributing to the formation of CHF [9.10].

Thus, progression of LVDD in patients with Q-wave myocardial infarction is associated with longer duration of ischemic heart disease and hypertension. As worsening diastolic dysfunction it observes expressed depression of left ventricular systolic function.

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## Results of morphological studies of the anterior segment of a visual organ under experimental chemical burns

**Abstract:** The study was performed on 100 white rats weighing 180–200 g.

Acetylation phenotype in rats was evaluated: fast acetylators (FA) and slow acetylators (SA).

Research showed that SA are as twice common as FA (64% vs. 36%).

In chemical burn degenerative changes of anterior segments of experimental animals lasting more than 30 days were noted independent of Acetylation phenotype.

In FA animals restoration of vascular and scleral tissues of the eyes demonstrates positive dynamics, whereas in SA destruction of these tissues does not slow, but also it increases to day 30. In cornea and lens degenerative processes increase both in FA and in SA towards the day 30 of the experiment and ABL to TA of cornea and lens become more severe as compared to day 3. These changes are more pronounced in FA. In SA degeneration of anterior segment tissues follows slow and prolonged pattern and requires extensive treatment than in FA, especially in relation to damage of sclera and choroid. Based on the results of the study, optimization of ocular burn management depending on Acetylation phenotype is recommended.

**Keywords:** ophthalmology, Acetylation phenotype, reparation, regeneration, tissue antigens (TA), antigen binding lymphocytes (ABL).

As we all know, major role in the development of the burn complications is attributed to the accumulation of the toxic products, which contribute to the progression of the anterior segment changes, slows and changes the regenerative process and leads to severe complications and visual loss. Tissue antigens (TA) in serum cause autointoxication and autosensibilization of the organism [11].

An ocular burn is a serious damage of the tissues of eye and on average its incidence rate is from 6.1 to 38,4% [4; 6; 11]. The incidence rate of chemical burns is from 25 to 80%. These burns facilitate the development of recurrent erosions, ulcerations, perforations, iridocyclitis, exsudation into anterior chamber, formation of corneal scars, which cause visually caused handicap and loss of ability to work in 40% of cases [1; 2; 10].

The process of xenobiotic detoxication occurs at the level of monooxygenase system in liver. It is well known, that there is acetylation system that functions similar to monooxygenase system in organism. N-acetylation is one of the major routes of biotransformation of xenobiotics and endogenous aminocompounds [3; 5; 7; 9].

According to the acetylation speed organisms are divided into two groups: fast (FA) and slow acetylators (SA). The magnitude of research suggests that acetylation phenotype is genetically determined [3; 8].

Taking into account that the consequences of ocular burn and the efficiency of treatment to a large extent is dependent on the nature of reparative processes, determination of speed and activity of inflammation and regeneration of the ocular tissues may be critical. Hence, the study of the reparation processes in the eye in FA and SA will enhance the knowledge of pathogenesis of ocular burn and optimization of management. However, the study of N-acetylation in ocular burn have not been undertaken. The data on features of damage and reparation of ocular tissues in chemical burns in patients with various acetylation phenotype is absent.

The aim of the research is to study the features and the extent of the damage of tissues of anterior segment in chemical burn in relation to acetylation phenotype (AP) in experiment.

**Material and methods.** The experiment has been performed on 100 white outbred male rats weighing 180–200 grams (Experiments

were performed in the laboratory of “Chronic Infectious Process” Scientific Research Institute of Microbiology, Infectious Diseases Epidemiology, prof. N. G. Gulyamov).

All the animals have been divided into two groups depending on the acetylation phenotype: fast acetylators (FA) and slow acetylators (SA). Acetylation phenotype was determined by the study of the urine of the animals with norsulfazol.

For urine collection a special cell for animals with urine collecting mechanism was constructed.

To determine Acetylation phenotype norsulfazol was used (10 mg/kg orally). Acetylation capacity of organism was considered slow if the clearance of norsulfazol reached 50% in 24 hours, and it was considered fast if the clearance reached 50% or more in the same period.

A model of chemical burn was created by application of 10% solution of NaOH for 10 seconds.

As a control anterior segment of animals (fast and slow acetylators) bred in similar general conditions was used. The experiment was performed in 4 stages — on 2, 5, 12 and 30 day after the burn.

The animals in each experimental and control group was decapitated at the stages of natural regeneration of ocular tissues on 2, 5, 12 and 30 day after the burn.

The blood was collected to determine the antigen-binding lymphocytes to tissue antigen of conjunctiva, sclera, cornea and the lens in chemical burn. This test was performed to determine the degree of degeneration of these tissues during 30 day period in groups being compared. The results in fast and slow acetylators were compared after statistical analysis using Student criteria for paired and unpaired units.

**Results.** The research showed the prevalence of slow acetylators — 64.0% over fast acetylators — 36.0% ( $p < 0.05$ ).

The following stage of the research was to study features of degenerative and reparative processes in the anterior segment tissues in relation to Acetylation phenotype. The research showed severe degeneration in the studied tissues in fast and slow acetylators on 2, 5, 12 and 30 day (see table).



Table 1. – Antigen-binding lymphocytes (ABL) to tissue antigens (TA) of the anterior segment in experimental animals in the dynamics of ocular chemical burn (n=100)

Tissue and decapitation day	ABL to TA in intact rats,%	ABL to TA in FA,%	ABL to TA in SA,%	P
<b>Conjunctiva</b>				
Day 3	1,1±0,015	4,3±0,36*	4,7±0,42*	>0,05
Day 5	0,8±0,01	3,3±0,33*	3,7±0,37*	>0,05
Day 12	0,9±0,02	5,7±0,31*	3,7±0,51*	<0,01
Day 30	1,6±0,007	9,0±0,54*	5,7±0,34*	<0,01
<b>Cornea</b>				
Day 3	0,7±0,02	6,0±0,52*	5,0±0,38*	>0,05
Day 5	0,7±0,008	3,7±0,33*	3,7±0,32*	>0,05
Day 12	1,2±0,03	5,3±0,41*	4,3±0,48*	>0,05
Day 30	1,1±0,03	6,3±0,44*	6,7±0,21*	>0,05
<b>Sclera</b>				
Day 3	0,7±0,01	5,7±0,38*	6,7±0,32*	>0,05
Day 5	0,9±0,03	7,0±0,55*	7,0±0,44*	>0,05
Day 12	0,8±0,02	5,7±0,42*	7,0±0,43*	>0,05
Day 30	1,0±0,02	4,3±0,22*	6,7±0,31*	<0,001
<b>Lens</b>				
Day 3	0,9±0,01	5,3±0,48*	7,0±0,16*	<0,01
Day 5	1,1±0,004	4,7±0,51*	4,6±0,22*	>0,05
Day 12	0,8±0,01	3,7±0,43*	5,3±0,33*	<0,05
Day 30	1,4±0,01	3,3±0,52*	8,0±0,36*	<0,001

Note: \* – reliability of difference of the appropriate units with similar values in intact animals, P — reliability of difference data in the groups being compared (FA and SA).

Comparative analysis of the ABL to TA of anterior segment showed that for FA and SA there are a number of similar features. Analysis of characteristics of degenerative processes and ABL to TA showed that in FA on day 30 of the burn

the severity of tissue damage reduces twofold, whereas in SA even on day 30 the extent of the vitreous syneresis is similar to the initial level of day 3–5 of the burn.

Similar results were obtained from the study of ABL to TA of choroid. Hence, in FA gradual restoration of choroid occurs and on day 30 it is only 1,5 times higher than normal level of ABL to TA of this tissue in 2%.

Comparative analysis of ABL to TA of cornea lens demonstrated that in FA damage of these tissues increased and on day 30 of the burn even prevailed the damage in SA.

As was indicated earlier, in SA it was noted that reparation of the tissues of anterior segment was slow and increased towards the end of the month. However, the ABL to TA of cornea and lens the process in SA was noted to be milder than in FA.

#### Conclusion

In FA animals restoration of vascular and scleral tissues of the eyes demonstrates positive dynamics, whereas in SA destruction of these tissues does not slow, but also it increases to day 30, In cornea and lens degenerative processes increase both in FA and in SA towards the day 30 of the experiment and ABL to TA of cornea and lens become more severe as compared to day 3. These changes are more pronounced in FA, In SA degeneration of anterior segment tissues follows slow and prolonged pattern and requires extensive treatment than in FA, especially in relation to damage of sclera and choroid.

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## Comparative parallels of gastric MALT lymphoma

**Abstract:** Analysis of literary material testifies to the lack of consensus about the tactics MALTS treatment, based on a sufficiently large clinical material. Moreover the steady growth of interest in this issue, has not yet provided any complete results of the variability of clinical features. So aim of the study was to study the clinical and morphological aspects of MALTS and to identify the role of surgery in treatment. After analyzing all the data we concluded that: in spite of the similarity of clinical manifestations MALTS and SC, but there are morphological, endoscopic and age differences between each nosology.

**Keywords:** stomach MALT lymphoma, stomach cancer, surgical treatment, chemotherapy, helicobacter pylori, eradication therapy.

Despite the emergence of new anticancer drugs, the development of clinical and experimental oncology question the treatment of malignant lymphoma remains relevant. According to WHO (WHO 2012) the last 10 years there has been increasing incidence of non-Hodgkin's lymphoma (NHL), which make up 5% in the structure of all malignancies. With a fairly wide variety of clinical variants of NHL special place is given to the extranodal manifestations. According to various authors the frequency of extranodal manifestations of up to 30% of all lymphomas. The highest frequency of place characteristic of the gastrointestinal tract. What occurs in 30–40% of cases in the structure of extranodal NHL.

According to the study of I. V. Poddubnaya (2006), most often in the pathological process involved the stomach — 39.7%, which in turn created some difficulties in the diagnosis and treatment in the definition of clinical management.

To date, based on the study of clinical material is highlighted extranodal lymphoma of the stomach — mucosae associated lymphoid tumor of stomach — MALTS.

Back in the early 90s of the last century on the basis of a detailed study of the morphological features of the tumor tissue has been allocated 3 histologic subtypes Multi-lymphomas which differ in the cellular structure. However, for over 2 decades, no clear clinical and morphological criteria, which would allow the set subtype MALTS.

With the development of modern medicine has been suggested in the past 15 years, which is associated with Helicobacter Pylori (HP) 90% MALTS. Consequently, it was proposed the theory that the cause of MALTS pathogenic infection is the presence of HP. This assumption is supported by sufficient efficacy of H. pylori therapy. In addition, over the last 5–10 years there views on the role of the presence of Epstein-Barr virus (EBV) in MALTS development.

Analysis of literary material testifies to the lack of consensus about the tactics MALTS treatment, based on a sufficiently large clinical material. Moreover the steady growth of interest in this issue, has not yet provided any complete results of the variability of clinical features. Therefore, the analysis of the literature points to the need to address the following issues:

1) MALTS — this clinical entity or a complicated form of the NHL?

2) What kind of symptoms characteristic in MALTS?

3) Is surgical treatment required in treatment of MALTS?

**Aim of the study:** to study the clinical and morphological aspects of MALTS and to identify the role of surgery in treatment.

**Materials and Methods:** In order to complete assessment of the study as the subject of we took — MALTS, research subjects were 75 patients who received inpatient treatment in National cancer research center and Tashkent city cancer center. Surgery was performed in 31 (41.38%) patients. The remaining 44 (58.78%) patients on chemotherapy produced against H. pylori treatment.

A comparison group consisted of 50 patients with gastric cancer  $T_{2-3}N_{0-1}M_0$  stage.

Study and control groups were compared in terms of age and sex, localization of tumor, infection of HP contamination, clinical manifestations and after treatment results.

The average age of patients in the study groups was identical, containing  $41,5 \pm 0,3$  years in the study group and  $47,3 \pm 0,5$  in control. In both groups, the incidence was significantly higher in subjects most in able-bodied age. HP contamination in stomach was studied in 63 (84%) patients and 40 (80%) patients in the control group. Materials were taken during endoscopy followed cytomorphological investigations. In addition, the determination was carried out on the basis of detection of EBV LMP-1 (latent membrane protein — 1) by immunohistochemical analysis. This study subjected in 23 patients with MALTS and 7 with stomach cancer.

**Results and Discussion:** The analysis of the material shows the highest incidence of the disease in the age range from 30 to 59 years (Diagram 1). However, as the chart with increasing age there is a decrease in the incidence of the main group. In contrast, the control group showed a dynamic increase in the incidence of gastric cancer in parallel age.

Among the main group noted the prevalence of women against men, accounting for 43 (57.3%) and 32 (43.7%), respectively. In the control group, in contrast to this, there were 37 men (74%) and 13 (26%) of women.

Endoscopic visualization in MALTS persons in most cases took place ulcerative infiltrative tumor growth — 63 (84%) patients. During EGDFS infiltrative growth in stomach cancer was observed in 17 (34%) patients, exophytic in 15 (30%). It should be noted that the total destruction of the stomach was observed in 9 (12%) patients with MALTS and in 14 (28%) GC. In the overwhelming majority of cases MALTS characterized by lesions of the gastric body (27 patients — 36%) and body + distal sections of the stomach (31 patients — 41.3%). The defeat of the proximal part of the stomach in MALTS was 10.6% (8 patients).

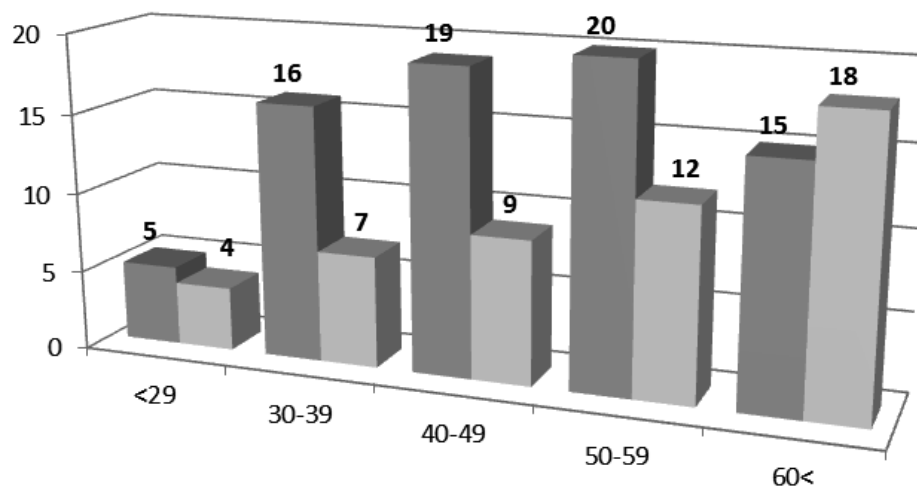


Figure 1. Distribution of patients by age MALTS, n=75; Gastric cancer, n=50

HP research contamination showed some differences between stomach cancer and MALTS. So, when stomach cancer with distal lesions form the presence of HP infection was typical in 84% of cases compared with the shape of the proximal lesions — 19%. Also, in 14 patients with a total form of SC in 100% of cases revealed the presence of HP. Total HP detection at SC was 64.8% varying degrees of contamination.

In contrast, in our study the frequency of detection of HP MALTS at 85.7%. It should be noted that severe contamination

with HP MALTS occurred in 31 (41.3%) cases, compared to 11 (22%) with RJ.

Immunohistochemical analysis to identify LMP-1 indicate the presence of EBV in 23 (36%) of 64 patients with MALTS. In the study of the presence of EBV in patients with gastric cancer (10 patients), indirect signs of the presence of the viral infection was not identified.

Comparative clinical manifestations MALTS and SC are shown in Table 1.

Table 1. – Evidence of clinical manifestation in study group

Signs	Pain	Gastrointestinal bleeding	Nausea	Vomiting	Heart-burn	Weight loss >5%	Without symptoms
MALTS n=75	25 34,3%	29 39,7%	37 48,5%	10 13,2%	17 22,0%	41 57,5%	4 5,9%
Gastric cancer n=50	18 36,0%	12 24,0%	26 52,0%	8 16,0%	13 26,0%	33 66,0%	4 8,0%

According to Table 1, the clinical manifestations of gastric cancer and MALTS not significantly differ. Polymorphism of clinical symptoms and their severity in both groups depends on the location of the tumor, its prevalence and the presence of functional complications in

the stomach. In particular, in 29 (38.7%) patients with MALTS indications for radical surgical treatment were: a) functional disorder of the stomach patency; b) bleeding from the tumor affected areas.

Surgical results are shown in Table 2.

Table 2. – The results of surgical treatment in the study groups

Study group	Extended gastrectomy	Postoperative complications				Lethality
		Pancreatitis	Wound abscess	Pneumonia	Tromboembolia	
MALTS n=75	29 38,7%	1 3,4%	2 6,8%	–	–	0
Gastric cancer n=50	50 100,0%	1 2,0%	2 4,0%	1 2,0%	1 2,0%	1 2,0%

According to these results, postoperative complications were observed in 3 (9.2%) patients of the main and 4 (8%) patients in control group. Although identical performance postoperative morbidity, mortality was not observed in the 1 group. In the control group died 1 (0.2%) patient, the cause of which was pulmonary embolism.

In treatments of 75 patients with MALTS distributed into 3 groups (diagr. 2).

It should be noted that in 97% of cases in the arsenal of therapeutic measures is included chemotherapy and therapy of H. pylori. Furthermore, in the control group all patients received standard adjuvant chemotherapy.

Analysis of long-term results of complex and combined treatment was performed in 68 patients of group 1. When MALTS in 41 (41.75%) patients have a complete regression of the tumor in 10 (13.3%) — partially. In 9 (12.0%) patients have disease progression (diagr. 3). It should be noted that in 9 (12.0%) patients with progression and in 8 (10.6%) with the stabilization process MALTS patients was verified the presence of infection with Epstein-Barr virus. Survival rates in patients with MALTS were significantly higher than in the SC, accounting for 83.5% against 53.4% for about the 5-year (Table. 3).

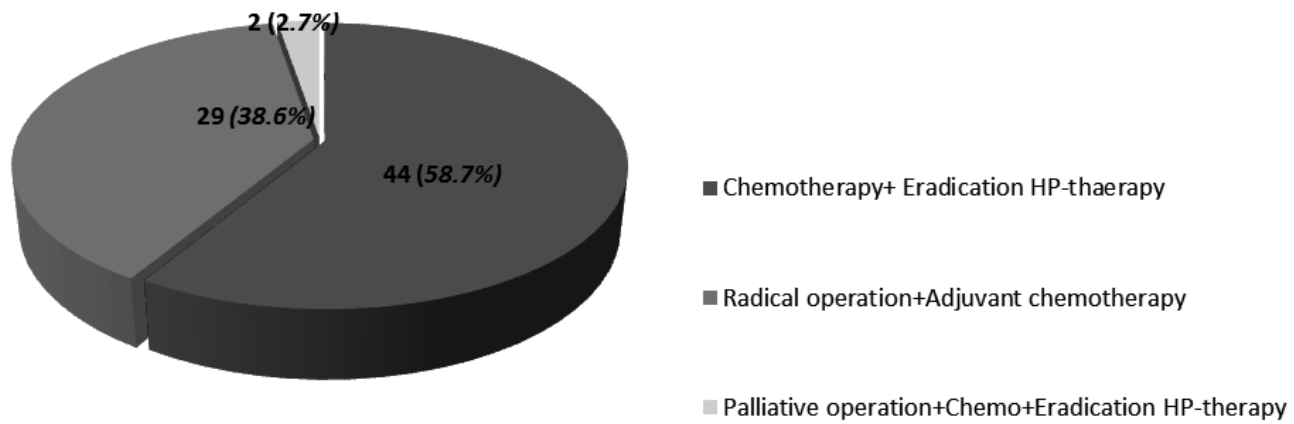


Figure 2. Treatment types in patients with MALT lymphoma, n=75

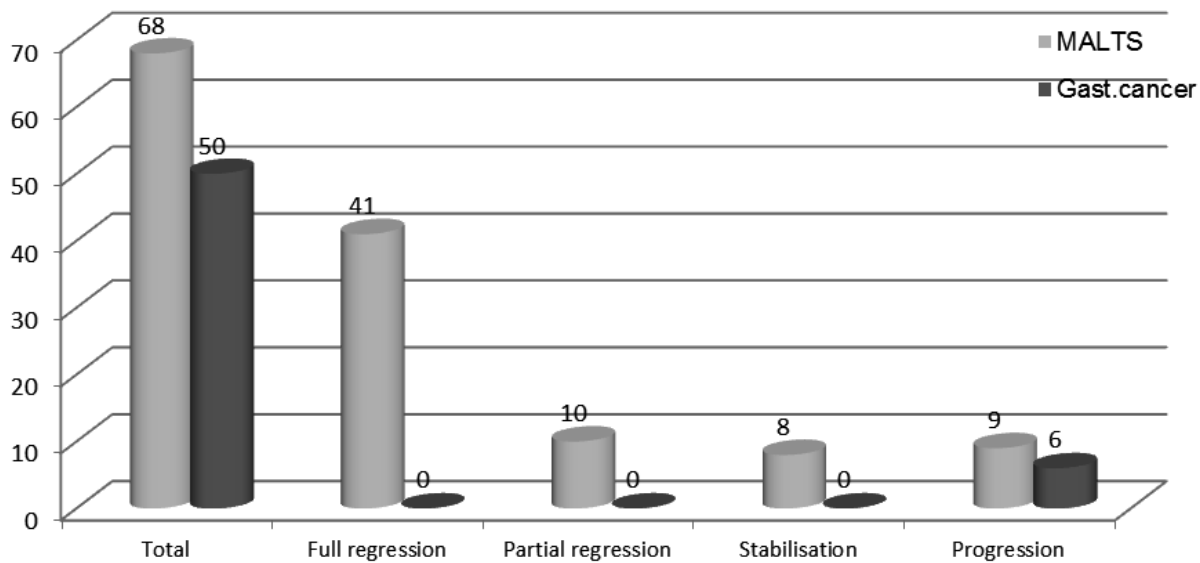


Figure 3. Combined and complex treatment results in patients with MALT lymphoma, n=68

Table 3. – Characteristics of remote results in study group

Type of the tumor	Patients amount	survivality (%)		
		1 year	3 year	5 year
Overall survival				
MALTS	63	100	91,3	83,5
Gastric cancer	50	73,4	59,1	53,4
Progression free survival				
MALTS	63	91,3	82,0	79,4
Gastric cancer	50	80,2	66,7	59,3

**Conclusions:**

1) In spite of the similarity of clinical manifestations MALT lymphoma and SC, but there are morphological, endoscopic and age differences between each nosology.

2) Using surgical treatment in MALT lymphoma advisable only when the presence of functional complications that does not increase the

postoperative complications.

3) HP contamination of stomach most peculiar in MALT lymphoma compared to SC, which in some cases can be combined presence of EBV.

4) Combined or complex treatment MALT lymphoma characterized by significantly high rates of survival against SC.

## An integrated approach to the diagnosis of psoriasis arthritis

**Abstract:** Ultrasound is very informative to detect soft tissue changes of elements and determination of the activity of the inflammatory process. The symptoms of synovitis, enthesitis, tenosynovitis which are characteristic for the diagnosis of PsA were determined only by ultrasound. The use of complex clinical, laboratory and instrumental methods of investigation, reduces the time of diagnosis of early PsA and improves the prognosis of the disease due to the timely appointment of basic drugs. Given the prostate and security, ultrasound allows the monitoring of the disease and correction of therapy.

**Keywords.** Psoriasis arthritis, ultrasound, synovitis, enthesitis, tenosynovitis.

Diagnosis of psoriasis arthritis (PsA), especially at an early stage, the complexity is even for experts due to the high heterogeneity of clinical disease [1; 6; 8; 10].

**Objective:** improvement of the integrated approach to the early diagnosis of psoriatic arthritis.

**Material and Methods:** The study included 75 patients PsA who were treated at the Republican Rheumatology center (RRC) of the Rock. Of these, 36 (48%) men of 39 women (52%), aged from 20 to 65 years old The mean age was  $45,4 \pm 14,5$  years. The duration of PsA, on average equal to  $9,5 \pm 2,7$  years, but psoriasis  $14,5 \pm 2,2$  years. CASPAR criteria are widely used in rheumatological practice and are a tool for the detection of PsA [12]. PsA patients were divided into 2 groups: 1 group – 33 patients with PsA disease duration up to 2 years (early PsA) and Group 2 – 42 PsA patients with disease duration of more than 2 years. Patients underwent standard clinical examination of peripheral joints and entheses. Counted articular index Richie and DAS. All patients included in the study, carried out a clinical examination on the index entheses LEI. In addition, we evaluated the point of attachment of the plantar fascia (PF) to the heel bone on both sides. Patients underwent laboratory diagnosis of a number of indicators, including CRP, RF, ESR, HLA-B27, and radiation (X-ray, ultrasound of joints and entheses). Radiological stage (R-phase) of joint damage was assessed by Shteynbrokeru. Sonography performed on a Mylab-40 apparatus (Esuobe, Italy) with a linear transducer with a frequency of 7.5–12 MHz. The obtained data were subjected to statistical processing on the PC Pentium-IV in programs designed in Excel package. Differences of mean values were considered significant at a significance level of  $P < 0.05$ .

**Results:** he most important syndromes in the clinical picture of PsA is a skin and joint, which define the basic content of the disease [1; 3]. In our material, the formation of PsA in 88% of patients took place against the background of already existing skin manifestations, 12% rash appeared after a long period from the beginning of the first symptoms of joint damage. Patients of the study group in the presence of PsA, observed all the characteristic clinical manifestations of the disease: arthritis was diagnosed in 100% dactylitis — 44%, enthesitis — at 40.0%, spondylitis — at 17.3%. Dactyl — a typical sign of PsA has clinical and diagnostic value [7; 11]. More than one third of patients (44%) was identified dactyls one or more fingers. It has prognostic value, often combined with rapid radiographic progression and destructive process. Mostly dactyls were characteristic of toes (26.6%) than the hands (10.6%), especially in patients with early PsA (36.3% and 12.1%, respectively). According to our data, signs of enthesitis in the clinical examination of various localizations were detected in 40.0% of patients. Clinical examination localization entheses by LEI index, depending on the duration of the disease showed that the clinical signs of enthesitis of the medial femoral condyle were more common in patients with a late and defeated the heel area (the place of attachment of the Achilles tendon and plantar fascia to the heel bone) — in patients with early PsA. Spondylitis arthritic forms of PsA with a primary lesion of the spine was observed in 17.4% of patients. Among them, in early arthritis in 10.7%. With increasing duration of disease incidence of this form it grew 22.3%. In 50.6% there was a combination of spondylitis with peripheral arthritis. Isolated spondylitis occurred only in 2% of patients. An important part in the diagnosis of PsA is the use of instrumental methods [5; 9; 10]. Radiographic changes were observed in 73.3% of patients.

Table 1. – Radiographic changes in the musculoskeletal system in patients with PsA

Symptoms of PsA	Early, n=33		Late, n=42	
	KOA-BO	%	KOA-BO	%
Periarticular osteoporosis	5	15,1	7	16,6
Narrowing gaps interarticular	6	18,1	21	50,0***
Cystoid enlightenment, erosion	6	18,1	29	69,0***
Bone proliferation	2	6,0	12	28,5***
Bone ankylosis, subluxation	0	0	8	19,0***

Note: \* – the differences regarding these significant group of early (\*\*\*) –  $P < 0,001$

X-ray analysis of the data flow depending on the duration showed that periarticular osteoporosis recorded with the same frequency in individuals with a disease duration of up to 2, and more than 2 years, 15.1% and 16.6%, respectively (table 1). In patients with early PsA cysts and erosion occurred in 18.1% of patients. Multiple bone erosion in the joints subluxation occurs most frequently in 69% of patients with late PsA. In patients with PsA duration up

to 2 years, bone proliferation occurs in 6.0% of patients, in patients with PsA late in 28.5% of patients. In our study, the frequency of radiographic abnormalities was 36.3% in patients with early and 92.8% in patients with PsA late.

To assess early PsA used ultrasound joints and entheses. Ultrasound joints and entheses was conducted in 50 patients. The appearance of liquid in the joints occurred in 90% of patients. Diffuse

thickening of the synovium was determined in 92% of patients in all groups studied joints. In 16% of patients with PsA determined roughness, heterogeneity in the cortical bone of the articular surfaces epimetaphysis, more frequently in patients with a disease duration of 5 years or more, and in some cases, changes were observed normal ehostruktury. Erosion and bone defects that are visible in both the longitudinal and transverse scan were found in 8% of patients with high activity of inflammation that we observed in the head of the metatarsal

and metacarpal bone. A characteristic feature of the early PsA is also enthesitis — inflammation at the site of attachment of tendons and ligaments to bone [2; 4]. In 36% of patients with PsA was observed early subclinical damage enthesitis (for US only). Tenosynovitis of the flexor finger was the most frequent lesion with PsA and was found in 66% of cases. These changes affected the tendon-fold teley fingers and wrist extensors. Analysis of the incidence of ultrasound signs with PsA according to the duration of the disease is presented in table 2.

Table 2. – The frequency of the ultrasonic symptoms depending on the stage of the disease

Ultrasound signs	Early, n=32		Late, n=18	
	abc	%	abc	%
The thickening of the synovial mebrane	29	90,6	17	94,4
The presence of liquid	30	93,8	15	83,3
Enthesitis	18	56,2	7	38,8
Tenosynovitis	24	75,0	9	50,0
Reducing the thickness of the cartilage	28	87,5	16	88,8
Erosion	1	3,1	3	16,6
Bone proliferation	2	6,3	8	44,4**

Note: \* – the difference relative to the first group of data are significant (\*\* –  $P < 0,01$ )

The thickening of the synovial membrane, the presence of fluid, reducing cartilage thickness was observed equally in patients with early and late PsA. Statistically significant differences were in relation to the incidence of erosion, marginal osteophytes growths that significantly more defined group of patients with a disease duration of more than 2 years. The defeat of the tendon and ligaments as enthesopathies and tenosynovitis was determined by ultrasonography in patients with early PsA in 1.4 times more likely. The defeat of the synovial membrane, hyaline cartilage does not depend on the duration of the disease, but reflect the activity of the disease, the involvement of the tendon and ligaments were more frequent in patients with early PsA. The appearance of bone proliferation was typical for patients with late PsA.

Thus, the most common change of the joints according to the US have been increasing the amount of synovial fluid, synovial proliferation, enthesitis, tenosynovitis of flexor tendons of fingers,

blurred and uneven joint surfaces. Ultrasound reveals numerous pathological changes in the investigated group of patients at an early stage (in some cases, from 3 to 6 months): synovitis — at 90.6%, enthesitis — at 56.2%, tenosynovit- 75%. Ultrasound reveals flexor tenosynovitis of fingers and feet was significantly ( $p < 0,05$ ) more frequently than it can be done with the help of X-ray diffraction method and clinical examination.

**Conclusion.** For timely diagnosis and adequate treatment of PsA is necessary to know peculiarities of the clinical picture and accounting characteristics of the course of the disease, using the existing diagnostic criteria. X-ray diagnosis of rheumatic diseases, which include PsA remains one of the main diagnostic methods. However, radiographic methods to identify signs of PsA can only be in 2–3 years or more after onset of the disease. These results suggest that one of the ways to improve the early diagnosis of PsA is the use of ultrasound joints of the hands and feet.

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## QT interval dispersion in patients with Q-wave myocardial infarction

**Abstract:** The article provides information on 252 patients with Q-MI (Q-wave myocardial infarction). Evaluation of correlation of QT interval dispersion revealed a significant correlation between its elongation and signs of unfavorable course of disease (anterior localization, left ventricular aneurysm, systolic dysfunction). There were no significant differences of QT interval dispersion in patients with ventricular arrhythmias of high gradations.

**Keywords:** QT interval dispersion, Q-wave myocardial infarction, ventricular arrhythmias.

Sudden cardiac death (SCD) is one of the most urgent problems in modern cardiology. This is exactly the variant of lethal outcome that occurs most frequently in cases of ischemic heart disease (IHD), especially in patients who endured myocardial infarction (MI). From 6 to 10% of patients die during the first year after MI, and half of them die unexpectedly [1]. A lot of studies have shown that the main electrophysiological cause of SCD is thought to be malignant ventricular arrhythmias (MVA). In the 70s-90s of XX century the studies were published that demonstrated an important prognostic role of VA in SCD [2; 3; 4].

It was suggested that QT dispersion (QTd) may reflect inhomogeneity of repolarization processes and, thus, a tendency towards development of arrhythmias [4; 5]. A number of studies revealed a connection between the increase of QTd and the emergence of VA in patients with IHD [5, 6]. In general, literature data show that the increased QTd is connected with a higher risk both for sudden death and total mortality [5; 7]. However, some researchers challenge the prognostic significance of QTd [1; 7; 8]. Thus, the duration of QT interval and its dispersion continue to take up an uncertain position in the prediction of outcomes in patients with MI.

**The objective of the study:** to assess the relationship between predictors of SCD in patients with Q-wave MI and QTd.

**Materials and methods:** the study included 252 male patients with Q-wave MI (middle age). Exclusion criteria were as follows: female gender, presence of MI in anamnesis, complete block of left bundle branch, patients older than 70 years, presence of congenital

QT abnormalities. The analysis of QTd was performed according to ECG records on the 12<sup>th</sup>-14<sup>th</sup> day of the disease. QT-interval was measured from the beginning of Q-wave to the end of T-wave in no less than 3 consecutive ventricular complexes. QTd was calculated as the difference between maximum and minimum values of the interval in 12 deflections. For characterization of VA we used the gradational classification of B. Lown and M. Wolf (1971) and the prognostic classification of J. Bigger (1982). Hourly qualitative and quantitative evaluation of VA was conducted in accordance with Lown-Wolf’s grading system. According to J. Bigger’s classification, after the old MI, potentially dangerous ventricular arrhythmias (PDVA) included VA>10 per hour, paired VA and group VA.

Statistical data analysis was performed using standard statistical methods with the help of the application software package SPSS 12.0. Data evaluation was performed using parametric and non-parametric methods. Data are presented as M±o (M — average value, o — standard deviation) in normal distribution, and as Me (25; 75) (Me — median value, 25<sup>th</sup> and 75<sup>th</sup> percentiles) in non-normal distribution. Differences were considered to be significant at p<0.05.

### Results and their discussion:

On average, this indicator in the group amounted to 82.6±13,2 ms (Me 82,9; IQR 73,3–91,8), i. e. the 25<sup>th</sup> percentile corresponded to 73.3 ms, the 50<sup>th</sup> percentile — 82,9 ms and the 75<sup>th</sup> percentile — 82,9 ms.

We studied the features of QTd in patients depending on the clinical course of Q-wave MI.

Table 1. – QT interval dispersion in patients with Q-wave MI on the 10<sup>th</sup>-14<sup>th</sup> day of the disease

Indicators	QT dispersion, ms	Reliability
Anterior wall, n=141	92,2±15,3	0,00001
Posterior wall, n=111	70,8±17,4	
Ejection fraction <50%, n=136	98,3±30,2	0,00001
Ejection fraction >50%, n=116	78,6±10,1	
Presence of aneurysm, n=72	95,1±11,3	0,00001
Absence of aneurysm, n=180	73,5±29,4	
Left ventricular diastolic dysfunction, n=137	90,0±30,7	0,00001
Without left ventricular diastolic dysfunction, n=115	78,6±9,8	
Heart failure of more than II class according to NYHA, n=100	93,9±25,9	0,00001
Absence of heart failure, n=152	68,7±10,4	

During the study of QTd on the 10<sup>th</sup>-14<sup>th</sup> day in patients with Q-wave MI of different localization we revealed significant dif-

ferences of QTd values in anterior and posterior localization of MI, what is explained by more common myocardial damage of

anterior localization. So, in the case of its anterior localization QTd amounted to  $92.2 \pm 15,3$  ms, in the case of posterior localization  $-70.8 \pm 17,4$  ms ( $p=0.00001$ ). We did not detect any significant differences of QTd values in patients with ischemic heart disease (IHD), arterial hypertension (AH) and diabetes mellitus (DM). So, QTd in patients with concomitant arterial hypertension amounted to  $69,0 \pm 28,6$  ms versus  $60,4 \pm 21,2$  ms in the group of patients without arterial hypertension ( $p>0.05$ ). The QTd value in patients with IHD and in patients without IHD in the anamnesis amounted to  $75,6 \pm 23,3$  ms and  $70,3 \pm 26,7$  ms, respectively ( $p>0.05$ ). QTd in the case of diabetes mellitus was  $86,3 \pm 24,3$  ms versus  $78,9 \pm 26,1$  ms in the case of its absence ( $p>0.05$ ).

During comparison of QTd values in patients with different degrees of acute heart failure (AHF) it was found that in patients with heart failure of III–IV class according to Killip there was a tendency towards the increase of this indicator ( $90,1 \pm 19,7$  ms), as compared to patients with heart failure of I–II class ( $80,1 \pm 17,5$  ms), although it did not reach statistical significance ( $p=0,07$ ). However, later during evaluation of dependence of QTd from the degree of chronic heart failure (CHF), these differences reach reliable values. So, in patients with heart failure of more than II class according to NYHA classification, QTd amounted to  $93,9 \pm 25,9$  ms ( $p=0.00001$ ). Moreover, in patients with ejection fraction  $<50\%$ , QTd value was significantly higher than in patients without systolic dysfunction ( $98,3 \pm 30,2$  ms

and  $78,6 \pm 10,1$  ms, respectively,  $p=0.00001$ ). The presence of left ventricular aneurysm in patients also caused significantly high QTd values ( $95,1 \pm 11,3$  ms versus  $73,5 \pm 29,4$  ms,  $p=0.00001$ ), what does not allow to exclude the dependence of repolarization processes from the degree of structural changes in myocardium.

In patients with left ventricular diastolic dysfunction (LVDD) we revealed significantly higher QTd values, in comparison with patients without LVDD ( $90,0 \pm 30,7$  ms versus  $78,6 \pm 9,8$  ms,  $p=0.00001$ ), which indicates inhomogeneity of myocardium in patients with LVDD.

Despite the fact that QTd values in patients with potentially dangerous ventricular arrhythmias (PDVA) were significantly higher in comparison with patients without PDVA, the differences did not reach reliable values ( $85,3 \pm 28,4$  versus  $78,6 \pm 27,6$  ms, respectively,  $p=0,07$ ).

For more detailed study on distribution of QT dispersion, the patients were divided into percentiles.

Approximately the same number of patients was detected in each percentile. But the structural analysis of patients revealed that the number of patients with PDVA in the 25<sup>th</sup> percentile constituted 57.1%, while patients without PDVA amounted to 42.8%, patients with PDVA in the 25<sup>th</sup>-50<sup>th</sup> percentile made up 70.9%, without PDVA — 29%, patients with PDVA in the 50<sup>th</sup>-75<sup>th</sup> percentile constituted 56.2% versus 43.7% without PDVA, 66.7% of patients had PDVA in the 75<sup>th</sup> percentile versus 33.3% of patients without PDVA.

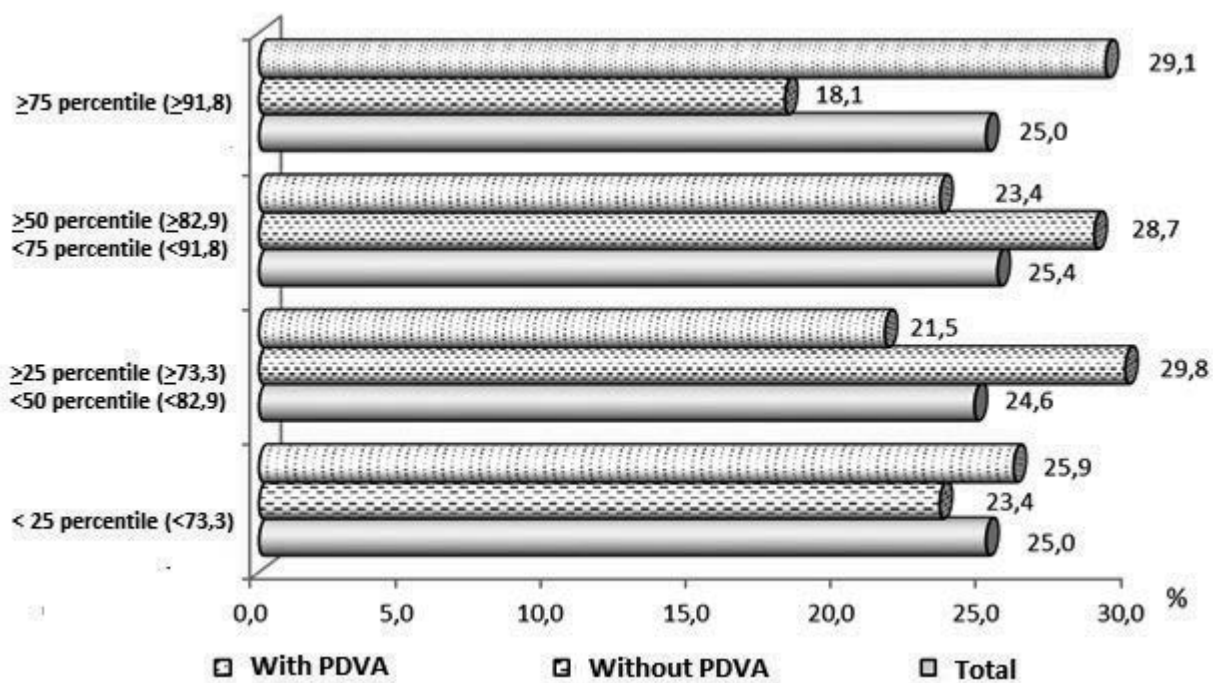


Figure 3.1. Distribution of patients with and without PDVA depending on the percentile values of QTd.

#### Conclusion:

Thus, maximum elongation of QTd was observed in patients with anterior localization of MI, which was complicated by development of left ventricular aneurysm, marked systolic and diastolic dysfunction. The study of QTd values in patients with and without

PDVA depending on the percentile values also showed no significant differences, although the group with PDVA included more patients with QTd above the 75<sup>th</sup> percentile (29.1% versus 18.1%; odds ratio 1.86; 95% confidence interval 0,99–3.48;  $p=0,07$ ).

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## Features immune status changes in children with chronic diseases of lower respiratory

**Abstract:** Thus, our findings of immunological status in different age groups in patients HBNDP celebrate the suppression of cellular immunity and phagocytes of neutrophils, activation of humoral immunity. It was found that changes in immune status were more pronounced in children aged 7–15 years.

**Keywords:** Children, immune status, chronic lower respiratory diseases.

**Relevance.** In the structure of respiratory diseases in children occupy an important place chronic lower respiratory diseases (CLRD) Main place in the structure belongs CLRD chronic bronchitis (CB) and bronchiectasis [1, 2, 6]. Despite advances in the treatment and prevention of chronic diseases caused by bacterial and viral microflora, increasing the number of severe and forms sluggish and torpid course of the inflammatory process, with frequent exacerbations, and low efficiency of the ongoing causal treatment, suggesting that failure of the immune system [3]. Today there is no doubt that immunological mechanisms are somehow involved in the development of almost any pathological conditions or being a cause of, or a consequence, and the main cause chronic disease and its complications [5].

When CLRD often develop secondary immunodeficiency, which can cause the development and chronicity of the pathological process with frequent relapsing little amenable to conventional therapy. In this regard, interest is the identification of the role of the immune system in the formation of CLRD in children [4].

This work is part of research carried out in our clinic, the aim of which is to study the features of the immune status in children with chronic bronchitis and bronchiectasis in exacerbation of the disease.

**Material and methods.** We observed 305 children with CLRD aged from 3 to 15 years. The patients presented two groups — 263 children with chronic bronchitis (CB), and 42 children with bronchiectasis (Beb) who were hospitalized in the pulmonology department of the Republican Specialized Scientific and Practical Medical Center of Pediatrics Ministry of Health of the Republic of Uzbekistan, and also studied performance of 20 healthy children of the same age. The comparison group consisted of 40 patients with acute bronchitis (OB).

Diagnosis is based on clinical classification of the main forms of bronchopulmonary diseases in children, approved at a special meeting of the XVIII National Congress on Respiratory Diseases (2009).

Immunological parameters were determined by indirect rosetting using monoclonal antibodies: by Garibe FU, [1995]. Determination of serum immunoglobulins A, G, M in the peripheral blood was performed by single radial immunodiffusion in gel G. Manchini et al [1965].

The data were processed by variation statistics using Student's Fisheru — personal computers using the application package.

**Results and discussion.** The study examined the immune status of patients with varying severity possible to establish the immunodeficient state with signs of stress humoral immunity and multi-directional nature of the immunological shifts. Patients with chronic bronchitis in both age groups identified the following deviations in the phase of exacerbation of the disease: a significant reduction in the relative and absolute number of CD3+ — lymphocytes (45,4±0,8% was in the group of children aged 3–6 years; 1165,4±22,6 mkl at 61,5±2,2%; 1377,9±44,2 22,6 mkl in healthy children, p<0.001) relative to the comparison group (54,7±1,4%; 1288,1±42 6 mkl p<0.01), in the older age group of 7–15 years-41,6±0,7%; 1100,4±16,622,6 mkl at 61,5±2,2%; 1377,9±44,2 mkl in healthy children, p<0.001, relative to the comparison group (50,2±2,5%; 1245,5±30,6 mkl p<0.01). Patients in Beb disease exacerbation phase as determined by changes in the immune status with the multidirectional nature of immunological changes, as evidenced by a significant decrease in the relative and absolute number of CD3+ lymphocytes to 36,8±0,6%; 915,1±22,6 mkl at 61,5±2,2%; 1377,9±44,2 mkl in healthy children, p<0.001, relative to the comparison group (50,2±2,5%; 1245,5±30,6 mkl p<0.001). A more pronounced decrease in CD3+ lymphocytes were observed in patients Beb differed from children with HB 1.1 times and was 1.7 times lower than the normal values. The content of the relative and absolute number of CD4+ — lymphocytes was reduced (33,4±1,1% was in the group of children aged 3–6 years; 389,2±13,8 mkl at 39,1±2,1%; 538, 7±15,6 mkl in healthy children, p<0.001) relative to the comparison group (38,5±1,2%; 495,9±19,8 mkl p<0.01) in older age group 7–15 years — 28,9±1,0%; 318,0±10,7 mkl at 39,1±2,1%; 538,7±15,6 mkl in healthy children, p<0.001, relative to the comparison group (37,9±1,3%; 472,0±16,2 mkl p<0.01). In the study of the number of CD4+ — lymphocytes in patients Beb content relative and absolute numbers of CD4+ — lymphocytes were significantly reduced to 25,1±0,9%; 229,7±9,6 mkl at 39,1±2,1%; 538,7±15,6 mkl in healthy children, p<0.001, relative to the comparison group (37,9±1,3%; 472,0±16,2 mkl p<0.001).

In relation to the group of children with HB indicators CD3 + lymphocytes was reduced 1.2 times and was 1.6 times lower than the normal range. It was noted a significant increase in the relative and absolute number of CD8 + lymphocytes ( $23,6 \pm 0,6\%$  was in the group of children aged 3–6 years;  $275,0 \pm 6,7$  mkl at  $19,5 \pm 1,8\%$ ;  $268,7 \pm 11,2$  mkl in healthy children,  $p < 0.001$ ) relative to the comparison group ( $19,4 \pm 1,1\%$ ;  $253,7 \pm 8,6$  mkl  $p < 0.01$ ) in older age group 7–15 years —  $25,8 \pm 0,5\%$ ;  $283,9 \pm 5,6$  mkl at  $19,5 \pm 1,8\%$ ;  $268,7 \pm 11,2$  mkl in healthy children,  $p < 0.001$ , relative to the comparison group ( $18,9 \pm 1,2\%$ ;  $235,4 \pm 7,7$  mkl  $p < 0.01$ ). Patients Beb also noted a significant increase in the relative and absolute number of CD8 + lymphocytes to  $27,2 \pm 0,5\%$ ;  $248,9 \pm 5,4$  mkl at  $19,5 \pm 1,8\%$ ;  $268,7 \pm 11,2$  mkl in healthy children,  $p < 0.001$ , which was 1.4 times higher compared to the children about (the comparison group). A more pronounced increase in CD3+ lymphocytes were observed in patients Beb differed from children with HB 1.1 times and was 1.4 times higher than the normal rates. IRI revealed a decrease in both age groups of patients in the 1.4 and 1.8-fold due to a significant increase in the number CD8+ cells compared to CD4+. Patients also showed Iran Beb decline 2.2 times lower than the normal value and 1.2 times lower in relation to the group of children with chronic bronchitis. It was noted a significant increase in relative and absolute numbers compared to healthy children — CD16+ lymphocytes and is  $12,9 \pm 0,4\%$ ;  $331,1 \pm 11,4$  mkl in children aged 3 to 6 years and  $14,2 \pm 0,4\%$ ;  $375,6 \pm 11,2$  mkl between the ages of 7 and 15 years, respectively ( $10,2 \pm 1,3\%$ ;  $228,5 \pm 16,2$  mkl in healthy children;  $P < 0.001$ ), in relation to the comparison group ( $10,1 \pm 1,0\%$ ;  $237,8 \pm 12,5$  mkl in children aged 3 to 6 years and  $9,8 \pm 0,8\%$ ;  $243,8 \pm 12,0$  mkl between the ages of 7 and 15 s, respectively,  $p < 0.05$ ). Patients Beb also noted a significant increase in relative and absolute numbers compared to the practical healthy children natural killer cells — CD16+ lymphocytes to  $16,4 \pm 0,7\%$ ;  $407,8 \pm 10,9$  mkl ( $10,2 \pm 1,3\%$ ;  $228,5 \pm 16,2$  mkl in healthy children;  $P < 0.001$ ), in relation to the comparison group ( $9,8 \pm 0,8\%$ ;  $243,8 \pm 12,0$  mkl  $p < 0.05$ ). In relation to the group of children with indicators of CB CD16+ lymphocytes was increased 1.2 times and was 1.6 times higher than the normal rates. We determined a significant decrease FAN (in the group of children aged 3–6 years figures were  $45,2 \pm 1,4\%$  at  $58,5 \pm 2,3\%$  in healthy children,  $p < 0.001$ , relative to the comparison group ( $55,8 \pm 2,1\%$   $p < 0.01$ ), in the older age group of 7–15 years —  $39,8 \pm 1,2\%$  at  $58,5 \pm 2,3\%$  in healthy children,  $p < 0.001$ , for relative to the comparison group ( $52 \pm 1,1\%$   $p < 0.01$ ).

Also determine the inhibition of neutrophil phagocytic function in patients Bab: a significant decrease FAN to  $35,2 \pm 1,0\%$  at  $58,5 \pm 2,3\%$  in healthy children,  $p < 0.001$ , relative to the comparison group ( $52,1 \pm 1,1\%$   $p < 0.001$ ). In relation to the group of children with HB FAN indicators were reduced by 1.1 times and was 1.7 times lower than the normal values.

In assessing the B-cell population we used as test level 1 determining the number of CD20 + lymphocytes, as well as the levels of immunoglobulins. In the group of children with chronic bronchitis showed a trend to an increase in CD20 + — lymphocytes in the peripheral blood, in relative and absolute terms (in the group

of children aged 3–6 years was  $26,8 \pm 0,9\%$ ;  $687,9 \pm 13,2$  mkl at  $16,4 \pm 0,5\%$ ;  $367,4 \pm 20,8$  mkl in healthy children,  $p < 0.001$ ) relative to the comparison group ( $17,2 \pm 0,7\%$ ;  $405,0 \pm 18,8$  mkl  $p < 0.01$ ), in the older age group of 7–15 years —  $32,4 \pm 0,7\%$ ;  $857,1 \pm 15,0$  mkl at  $16,4 \pm 0,5\%$ ;  $367,4 \pm 20,8$  in healthy children,  $p < 0.001$ , relative to the comparison group ( $18,1 \pm 0,8\%$ ;  $450,3 \pm 17,1$  mkl  $p < 0.01$ ).

Beb Patients also tended to increase in CD20+ — lymphocytes in the peripheral blood, in relative and absolute terms ( $35,6 \pm 0,6\%$ ;  $885,2 \pm 10,2$  mkl at  $16,4 \pm 0,5\%$ ;  $367,4 \pm 20,8$  mkl in healthy children,  $p < 0.001$ ) relative to the comparison group ( $18,1 \pm 0,8\%$ ;  $450,3 \pm 17,1$  mkl  $p < 0.001$ ). On activation of humoral immunity showed increased IgM immunoglobulin concentrations in patients 3–6 years was 1.3 times higher compared with healthy children and averaged  $114.5 \pm 3,1$  mg/% ( $p < 0.01$ ), relative to the control group is 1.2 times ( $97,2 \pm 3,2$  mg/%  $p < 0.01$ ) in patients 7–15 was an increase of 1.4 times of the average of up to  $126,8 \pm 2,5$  mg/% relative to the control group is 1.2 times ( $102,5 \pm 3,4$  mg/%  $p < 0.01$ ). Patients Beb also noted an increased concentration of IgM and was 1.7 times higher compared with healthy children and averaged  $154.2 \pm 2,7$  mg/% ( $p < 0.001$ ) relative to the control group 1, 5 times ( $102,5 \pm 3,4$  mg/%  $p < 0.01$ ). In relation to the group of children with HB level of IgM was increased 1.2-fold. At the same time, the content of IgG in the group of patients with chronic bronchitis at the age of 3–6 years was 1.1 times reduced as compared to healthy children and averaged  $845.2 \pm 17,1$  mg/% ( $p < 0.01$ ) in relation to the comparison group to 1.0 times ( $912,6 \pm 16,2$  mg/%  $p < 0.05$ ) in patients 7–15 years have seen a decline in their number is 1.2 times as compared with the healthy children and It averaged  $768.9 \pm 15,8$  mg/% ( $p < 0.001$ ). The content of IgG in patients in Bab was reduced 1.3 times as compared with the healthy children and averaged  $702,6 \pm 16,1$  mg/% ( $p < 0.001$ ) relative to the control group is 1.3 times ( $908,7 \pm 18,4$  mg/%  $p < 0.01$ ).

In relation to the group of children with HB IgG level was reduced by 1.1 times. IgA concentration in the examined children with HB decreased in patients 3–6 years by 1.2 times as compared with the healthy children and averaged  $87.4 \pm 3,9$  mg/% ( $p < 0.01$ ), in relation a comparison group of 1.2 times ( $102,5 \pm 3,4$  mg/%  $p < 0.05$ ) in patients 7–15 years have seen a decline in their number is 1.4 times as compared with the healthy children, and the average was  $75.2 \pm 4,1$  mg/% ( $p < 0.001$ ) relative to the control group by 1.3 times ( $104,6 \pm 2,8$  mg/%  $p < 0.01$ ). It should be noted that children of preschool age, there was a greater reduction and than in school-age children. The patients Beb IgA concentration is decreased by 1.7 times compared with healthy children and averaged  $64.5 \pm 3,4$  mg/% ( $p < 0.001$ ) relative to the control group by 1.6 times ( $104,6 \pm 2,8$  mg/%  $p < 0.01$ ).

**Conclusions.** In patients with chronic diseases of the lower respiratory tract as a result of the research found that deforming chronic bronchitis and bronchiectasis mostly in children is accompanied by pronounced changes in immune status, confirming the presence of a chronic inflammatory process. It is important to establish immunity defects in terms of not only clarify the mechanisms of the pathogenesis of the disease, but also raising funds to facilitate correction of the broken links of immunity.

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## Peculiarities of immunological indications changes in children ill with chronic bronchitis

**Abstract:** 100 children with chronic bronchitis and 22 healthy children aged 3–15 years were enrolled in the study. Thus, the study of immune status in children with CB made it possible to reveal deep changes of T — cellular immunity chain as considerable decrease of the amount and functional activity of neutrophils that appears to be predetermining endogenous moment of development and progress of chronic bronchitis in children. The immune status was higher in the group of school — age children.

**Keywords:** children, chronic pneumonia, immunological indicators, bronchitis, lymphocytes.

**Urgency of problem.** Chronic inflammatory diseases of the lungs are the actual pediatric problem as their frequency has been growing in recent years and clinical manifestation are characterized by severe course and early disability of patients [1; 10; 11]. The complexity of chronic bronchitis problem to a certain degree found its reflection in International statistic classification of diseases and problems associated with health (the 10<sup>th</sup> WHO revision) where various variants of chronic bronchitis are listed: simple, mucopurulent, mixed, etc presenting difficulty in clinical distinction that causes certain complexity in every day practice [5; 9]. Impairment of drainage function of bronchi contributes to development of infections process with activity and recurrence depending to a considerable degree on local immunity of bronchi and development of secondary immunological insufficiency [3; 5]. Chronic bronchitis in children may be the manifestation of a whole number of other bronchopulmonary sufferings (acquired, hereditary, congenital) with their differentiation often presenting certain complexities [4; 5; 6; 7; 8; 12].

Among important factors in pathogenesis CB belongs to non-specific and specific immune reactions. As for immune system the character, depth, duration of inflammation and immune response are regulated by means of cytokines [13].

General changes of children immunological status are probably connected with the fact that in all this pathology bronchopulmonary system is suffering. In deficiency of immunoregulatory cells, antigen-specific effector reactions of humoral and cellular type develop with strengthening more than once, the level of antigen — specific lymphocytes directed not only against antigens causing the disease but against the pulmonary tissue itself is growing sharply. The decrease of T — suppressors function in various CNDL forms is a

key mechanism in the development of immunopathological reactions in various diseases in children [3; 5].

The aim of the research. To estimate immunological indicators in diagnosis of chronic bronchitis in children.

**Material and methods of the research.** 100 children with chronic bronchitis and 22 healthy children aged 3–15 years were enrolled in the study. The patients underwent the following medical research: estimation of T-lymphocytes and their subpopulations ( $CD_3^+$ ,  $CD_4^+$ ,  $CD_8^+$ ) number, natural killers ( $CD_{16}^+$ ), B- lymphocytes ( $CD_{20}^+$ ) by means of Gurary N. I. method (1981) [2]; concentration of serum immunoglobulin's A, G, M in the peripheral blood according to Manchini G. et al. method (1965);

### Results and discussion.

As it is seen from Table I in children with CB changes in both cellular and humoral immunity system are noted. They have one- directed immunological shifts characterized by T- cellular immunodeficiency. Reliable decrease of leucocytes in both groups to  $6482 \pm 320.0$  and  $5362 \pm 625.0$ , accordingly ( $p < 0,001$ ) is established in children with chronic bronchitis during the period of exacerbation of the disease.

Such indications as relative and absolute number of lymphocytes  $32.1 \pm 0,2$  and  $31.8 \pm 1.1$  accordingly, decrease reliably compared to normal ones and there is no different nature between two groups.

As it is seen from the presented data in children with CB in the period of exacerbation of the disease the following deviations have been revealed: reliable decrease of T — lymphocytes ( $CD3^+$ ) ( $44.8 \pm 0.2\%$  in children aged 7 -15 years and  $49.1 \pm 0.3\%$  at the age of 3-6 years in  $61.5 \pm 2.2\%$  in practically healthy children,  $p < 0,001$ ;  $p < 0,001$ , their subpopulations: T- helpers ( $CD4^+$ ) ( $21.2 \pm 3.2\%$  in children aged 7-15 years and  $24.6 \pm 1.9\%$  in children aged 3- 6 years;  $39.2 \pm 2.1\%$

in practically healthy children  $p < 0,001$ ;  $p < 0,001$ ;  $p < 0,001$ ) and T-suppressors (CD8+) ( $15,7 \pm 0,4\%$  in children under school age;  $13,0 \pm 0,1\%$  in school-age children, in  $19,5 \pm 1,8\%$  in practically healthy children,  $p < 0,01$ ,  $p < 0,01$ . changing of CD3+CD4+CD8+ lymphocytes

were more marked in the group aged 7–15 years compared to children aged 3–6 years ( $p < 0,01$ ;  $p < 0,001$ ). in this category of patients T-cellular immunodeficiency had hyposuppressive purposefulness, that was confirmed by low level of F- suppressors.

Table 1. – Immunological indications of children with chronic bronchitis (M±m)

Analyzed indications	Practically healthy children n=22 (I)	Period of exacerbation of the disease		P	P <sub>1</sub>	P <sub>2</sub>
		3-6 age n=38(II)	7-15 age n=62 (III)			
Leucocytes, abs.	8540±421,0	6482±320,0	5362±625,0	<0,05	<0,001	<0,001
Lymphocytes, %	34,6±2,3	32,1±0,2	31,8±1,1	<0,05	<0,01	<0,01
Lymphocytes, abs.	2948±234,0	2080±432,0	1705±105,0	<0,05	<0,01	<0,01
CD3+, %	61,5± 2,2	49,1±0,3	44,8±0,2	<0,001	<0,001	<0,001
CD3+ abs	1676±193,0	1021±45,0	763±49,0	<0,001	<0,01	<0,01
CD4+ %	39,2±2,1	24,6±1,9	21,2±3,2	<0,001	<0,001	<0,001
CD4+ abs	1032±98,0	512±98,0	361±35,0	<0,05	<0,001	<0,001
CDS+, %	19,5±1,8	15,7±0,4	13,0±0,1	<0,01	<0,01	<0,001
CDS+, abs	595±75,0	493±19,2	473±38,0	<0,05	<0,01	<0,01
IIR (CD4/CDS)	2,0±0,2	1,6±0,3	1,6±0,5	>0,05	>0,05	>0,05
CD 16+, %	10,2±1,3	16,8±1,7	19,7±2,1	<0,001	<0,001	<0,01
CD 16+, abs	278±32,0	349±11,0	335±11,0	<0,05	<0,05	<0,01
Phagocytosis, %	58,5±2,3	46,4±1,2	43,7±0,8	<0,001	<0,001	<0,01
CD20+ %	16,4±0,5	35,6±1,6	37,3±2,2	<0,001	<0,001	<0,01
CD20+ aoc.	774±97,0	623±23,0	587±21,0	<0,01	<0,01	<0,05
IgG, Mg / %	938,3±17,6	1901,1±33,5	2118,2±40,7	<0,001	<0,001	<0,001
IgA mg / %	107,9±3,6	168,4±4,0	184,4±3,2	<0,001	<0,001	<0,01
IgM, mg, %	90,7±2,8	202,4±5,0	212,3±4,2	<0,001	<0,001	<0,05
CIC	1,01±0,1	1,31±0,1	1,42±0,1	<0,05	<0,001	<0,05
ASL, %	1,1±0,1	3,2±0,8	4,9±0,6	<0,01	<0,01	<0,001

Note: P – reliability of differences between groups I and II;

P<sub>1</sub> – reliability of differences between groups I and III;

P<sub>2</sub> – reliability of differences between groups II and III.

IIR (CD4 / CD8) in both groups of patients was decreased to 13 times mainly due to the number CD4+ of lymphocytes.

There was noted reliable increase of natural killers in comparison with practically healthy children – CD16+ - lymphocytes and makes  $16,8 \pm 1,7\%$  in children aged 3 – 6 years and  $19,7 \pm 2,1\%$  at the age of 7 – 15 years accordingly ( $10,2 \pm 1,3$  in practically healthy children;  $P < 0,001$ )

There was tendency to increase of B – lymphocytes (CD20+) in peripheral blood in absolute numbers to  $623 \pm 230$  and  $587 \pm 21,0$   $P < 0,001$ ,  $P < 0,05$ . It was particularly marked in the group of elder children.

In the study of phagocytosis level we noted that phagocytosis in most children aged 3- 6 years with CB had been considerably decreased to  $46,4 \pm 1,2\%$  (within the norm of  $58,5 \pm 2,3$ ,  $P < 0,001$ ). It is known that immunoglobulin's of the blood serum are considered to be one of the main indications of humoral immunity. Entering the chain of immunological reactions, immunoglobulin's have a certain significance in CB pathogenesis. From the side of humoral immunity in children ill with CB there was noticed marked hypoinmunoglobulinemia, sharp increase of IgM level ( $202,4 \pm 5,0\text{mg}/\%$  and  $212,3 \pm 4,2\text{mg}/\%$  against  $90,7 \pm$

$2,8\text{mg}/\%$  in practically healthy children,  $P < 0,001$ ), IgA and IgG levels increased more in the group of under – school age children ( $P < 0,001$ ) CIC concentration in children ill with CB was also much higher than in practically healthy children ( $1,32 \pm 0,1$  and  $1,4 \pm 0,1$ ,  $P < 0,01$ ;  $P < 0,05$ ), that is the evidence of inflammatory process activity.

In children ill with chronic bronchitis ASL was revealed in the blood in the period of exacerbation that was the evidence of presence of autoimmune reaction. With this, ASL increased 4–5 times in a group of school age children and made  $4,9 \pm 0,6\%$  and  $3,2 \pm 0,08\%$  in comparison with practically healthy children ( $1,1 \pm 0,1\%$ ,  $P < 0,001$ ;  $P < 0,01$ ).

**Conclusion.** Thus, the study of immune status in children with CB made it possible to reveal deep changes of T-cellular immunity chain as considerable decrease of the amount and functional activity of neutrophils that appears to be predetermining endogenous moment of development and progress of chronic bronchitis in children. The immune status was higher in the group of school – age children. Probably, the main disturbance in the work of immune system is caused by autoimmune process which in complex with inflammatory reactions destroys the organs and tissues.

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## Intrabronchial laser therapy in children with chronic bronchitis and chronic pneumonia

**Abstract:** The observation studied 29 children with purulent endobronchitis at the age from 1 to 13 years old. Among them there were 17 boys and 12 girls. 9 of children had recurrent bronchitis, 10 children had chronic pneumonia, and 10 children were with foreign bodies in the bronchus. The results obtained after treatment in children with CB receiving laser therapy show reliable decrease of neutrophils number to  $73,1 \pm 3,5$  in comparison with the data before treatment  $90,4 \pm 6,3$  ( $p < 0,01$ ). The number of alveolar macrophages increases to  $15,1 \pm 3,1$  in comparison with the data before treatment  $2,8 \pm 0,1$  ( $p < 0,01$ ), the amount of cytosis decreases in comparison with the data before treatment  $6,9 \pm 1,2$  ( $p < 0,01$ ).

**Keywords:** children, chronic bronchitis, chronic pneumonia, laser therapy.

Intrabronchial inflammatory lung diseases are considered to be an actual pediatric problem as their frequency increases in recent years and clinical manifestations are characterized by severe course and early disability of patients (2–6).

Treatment of nonspecific lung diseases (NLD) is provided with traditional sanation bronchoscopy with use of different medications (antibiotics, steroids, enzymes, etc.) (1,7–9). For the treatment of purulent endobronchitis in NLD it is also used helium-neon laser.

The aim of the presented investigation was the improvement of the treatment results of the purulent endobronchitis in children with nonspecific lung diseases with intrabronchial use of gallium-arsenide laser.

The observation studied 29 children with purulent endobronchitis at the age from 1 to 13 years old. Among them there were

17 boys and 12 girls. 9 of children had recurrent bronchitis, 10 children had chronic pneumonia, and 10 children were with foreign bodies in the bronchus.

The lung washing out (lavage) of 10 children with urolithiasis served as a model of bronchoalveolar-lavage fluid (BALF) in "healthy lung".

The children had not pathology of the respiratory tract, the lavage was taken during the surgical operation through the intubation tube. In the comparison group there were children with chronic pneumonia, recurrent bronchitis and foreign bodies of the bronchus.

These children received traditional therapy, during their bronchoscopy it was not used laserotherapy. In order to perform endobronchial laser irradiation it was used low-intensive semi-conducting laser on the gallium-arsenide base (ALT "Sogdiana", Uzbekistan),

with persistent acting in there diapason with the length of wave 0.67 mkm, in the dose 4.87 Jg\sm<sup>3</sup>.

Laserotherapy was performed in the following way. During the bronchoscopy it was carried out lavage with use of physiologic saline until the clear irrigated waters from the orifice of segmental bronchus. Subsequently, it was irradiated by the use of the light of gallium-arsenide laser with exposition during 1 minute.

From the sediment of BALF centrifugation it was prepared the smear with the following fixation. Calculation of the cells elements was performed under the immersion for 100 cells with the percentage evaluation of the cytological composition.

The distinctive clinical features of die diseases in children were the frequency of cough and the amount of expectoration; these cough was more frequent and the expectoration amount was larger in children who had chronic pneumonia. Also, auscultative data were distinguished: the presence of the local bubbling rales in children with chronic pneumonia, scattered dry and single bubbling rales in children with recurrent bronchitis.

During the bronchological investigation in all patients it was diagnosed purulent end bronchitis. The control group was characterized with prevailed amount of alveolar macrophages (AM) 91.4±2.0; low amount of neutrophils (NP) 10.8±2.0 and lymphocytes (LC 7.8±1.2. In all examined children, except children

from the control group, it was determined the increasing amount of neutrophils and lymphocytes and die sharp decreasing amount of alveolar macrophages.

After treatment of children with CB, receiving laser therapy, reliable decrease of neutrophils number to 67,1±6,4 is noted in comparison with the data before treatment 89,7±2,7 (p<0,01), the number of alveolar macrophages increases to 25,8±7,4 in comparison with the data before treatment 4,9±1,7 (p<0,01), the amount of cytosis decreases to 1,8±0,7 in comparison with the data before treatment — 11,7±0,6. The number of lymphocytes also increases.

The results obtained after treatment in children with CB receiving laser therapy show reliable decrease of neutrophils number to 73,1±3,5 in comparison with the data before treatment-90,4±6,3 (p<0,01). The number of alveolar macrophages increases to 15,1±3,1 in comparison with the data before treatment -2,8±0,1 (p<0,01), the amount of cytosis decreases in comparison with the data before treatment 6,9±1,2 (p<0,01).

Thus, treatment with the use of gallium-arsenide laser is one of the acceptable and effective methods of treatment of purulent endobronchitis in children with NLD. This method allows reaching during the short time a restoration of the bronchial patency, regression of the inflammatory process in bronchus and also restoration of the local lungs defense.

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## FarGALS efficiency in complex treatment of HIV-infected children with acute purulent sinusitis

**Abstract:** The effectiveness of the local treatment of inflammatory purulent processes can be significantly increased through the use of evidence-based many-component compositions based on etiology, pathogenesis, the difference between the current process, where each of the components of the targeting to a particular inflammatory factor. Under our supervision there were 62 HIV-infected children, treated in a children's ENT clinic for acute purulent sinusitis. FarGALS use solution to complex treatment and rehabilitation of ENT-organs from HIV- infected children, improve hygienic index by 43%, reduces up to the

full version of inflammation, enhances the non-specific protective functions of the mucous membranes of upper respiratory tract and is pronounced positive effect on mucociliary transport mucous membrane of the nasal cavity and sinuses.

**Keywords:** treatment, a HIV-infection, drug, FarGALS, acute sinusitis, acute, sinusitis.

A variety of clinical manifestations of HIV-infection due to the addition of opportunistic infections, among which the most important are fungal, bacterial and viral infections. At AIDS children may manifest a typical or recurrent diseases of the ear, sinuses, mastoiditis, tonsillitis, pharyngitis, an inflammation of the orbital and periorbital tissue, oropharyngeal candidosis and infectious lesions of teeth [1; 2; 10].

Treatment of acute purulent sinusitis (APS) in HIV-infected children should be based on a limited use of antibiotics and the impact on the various links in the pathogenesis of inflammation in the paranasal sinuses. Features of the etiology, clinical manifestations, trends and specifics of ENT diseases complications in HIV-infected people in each of the stages of the disease, including background antiretroviral therapy are fundamental to the definition of a strategy and tactics of treatment. This dictates the urgent need to implement the study. In the structure of the incidence of upper respiratory tract acute sinusitis in HIV-infected children knitting tool is one of the leading places. A. Y. Ovchinnikov and colleagues point out that over the past 10 years in HIV-infected children of morbidity sinusitis increased by 3 times, and the patients hospitalized in the Department of LOR — about diseases of the paranasal sinuses, now account for 2/3 of the total number of HIV children infected patients [3; 4; 6].

Diagnosis of acute sinusitis is not complicated. History, rhinoscopy, sinus X-ray graphy in direct projection, ultra sound, when the need to computer tomography is almost always allow to diagnose correctly. “The gold standard” in the diagnosis of sinusitis is sinus puncture, obtaining of the contents, followed by smear microscopy study it.

At present, the treatment of HIV-infected children with APS is more appropriate to use non-invasive methods. To this end, locally and parentation morally they appointed someone antibiotics broad-spectrum, antihistamines, mucolytics, decongestants. It is proved that the local use of antibacterial drugs has substantial advantage over the system [3; 8; 11; 12].

The effectiveness of the local treatment of chronic inflammatory processes can be significantly improved by of evidence-based multicomponent-component compositions based on etiology, pathogenesis, the difference between the current process where each component direction acts on this or that factor of inflammation, therefore drug is FarGALS. Group of authors of Uzbekistan developed and patented technology for production of a new drug that has no analogues in the world. Clinical trials of the drug have been conducted, and it was registered under the name “FarGALS”. On the technology it has been declared an international priority in the 110 countries in the European Patent Office.

In the pharmaceutical properties of the drug is related to the antiseptic and wound-healing agents. FarGALS has a broad spectrum of antimicrobial activity: active against Gram-positive and Gram-negative, aerobic and anaerobic, asporogenous and spore-forming bacteria (*Escherichiacoli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Clostridium perfringens*, *Citrobacter freundii*, *Enterobacter agglomerans*, *Serratia arcscens*, *Morganella morgani*, *Acinetobacter calcoaceticus*, *Bacteroides fragilis*, *Salmonella typhimurium*, *Salmonella typhi*, *Shigella sonnei*, *Proteus mirabilis*, *Candida genus fungi*, and *Helicobacter pylori*), contributes to improving the vascularization of ischemic areas. It has a wound-healing and anti-inflammatory effect. In addition, the laboratory of the National collection of bacteria and pathogens of

groups I–II infections studied the drug on FarGALS representatives of cultures: *Vibrio cholerae*, *Iersiniapestis*, *Brucella abortusbovis*, *Bacillus anthracis* and the identified pathogenic effect on these cultures [5; 7; 8; 9].

Clinical trials of the drug FarGALS conducted at the Medical Academy of Uzbekistan (Department of General Surgery, Department of Obstetrics and Gynecology № 2) Contaminated Surgery Center.

**The aim of this study** was to investigate the clinical effectiveness of antiseptic FarGALS drug in the complex therapy in HIV-infected children with APS by local use.

**Materials and methods.** Under our supervision there were 62 HIV-infected children aged 6 to 16 years, treated in a children's ENT clinic for APS. The study included about an equal number of boys and girls (21 and 41). Diagnosis of sickness in all cases was confirmed by X-ray examinations and diagnostic punctures sinuses. In determining the species composition of the microflora of the sinuses, it was noted that the most frequently sown *Streptococcus pneumoniae* — 32%; *Haemophilus influenzae* — 20%; *Moraxella catarrhalis* — 21%; other microflora (including *Staphylococcus aureus*, *Staphylococcus epidermum*) — 27%.

All in coming studied history, data rhinoscopy, rinopneumometry, as well as conducted clinical standard examination.

**Results of Research and discussion.** Patients were divided us into two groups — basic and control. Patients of the main group (n=32) after application anesthesia mucous nasal hull 10% lidocaine through the lower nasal passage needle puncture is made Kulikovski upper maxillary sinuses. Sinus washed “clean water” 0.9% sodium chlorite solution of chloride. After removing the supernatant was injected into the sinus FarGALS 5 ml diluted 1:3 with isotonic sodium chloride solution chlorite. After that, the patient is put to bed for 30 minutes on the side of the affected sinus.

Parenteral patients was resepted — on 1,0 x 2 times daily intramuscular ceftriaxone, carried giposensibilizing therapy vesselness in nose drops. In the control group of patients (n=30) were treated similarly, but after washing their FarGALS sinus cavity is not administered.

During the observation noted that the main group in 32 (84.4%) persons on the 3rd day from the beginning of treatment to normal body temperature, aching pain disappear in the cheek on the side of inflamed sinuses, became nasal breathing disappeared of conventionally pain. In the control group it occurred on 4–5th day.

A particularly pronounced effect turns out to be the solution to FarGALS mucosilication clearance of the mucous membrane of the nasal cavity and sinuses, leading to more fast. The physiological cleansing the sinuses of pus. He showed marked secretoliation effect, resulting in 3 days earlier than in the control group, was restored patency of the natural sinus governmental fistulae.

In the main group of patients with APS after two punctures and administration FarGALS solution improves the general condition of the control group — after 3–4 punctures.

Clinical cure patients of the group occurred 2–3 days earlier than the control.

**Conclusions:** Application FarGALS solution to complex treatment and rehabilitation of upper respiratory tract in HIV-infected children to a large extent and in a shorter time, reduces the clinical symptoms of inflammation during bacterial, fungal

infection, improves hygienic index by 43%, reduces up to complete reduction of inflammation, enhances the non-specific protective functions of the mucous membranes and upper respiratory

tract was pronounced positive effect on mucociliary transport the mucous membrane of the nasal cavity and sinuses.

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## Morphological structure of encephalomyelitis and myelitis using several treatments (experimental research)

**Abstract:** A special place among the infectious diseases of the central nervous system (CNS) occupy encephalitis (brain inflammation), and myelitis (segmental spinal cord injury caused by acute inflammation) in children.

One of the treatments, the use of which is possible in the acute stage and the recovery stage is ozone.

Thus, the proposed scientific research is devoted to solving problems identifying of morphopathogenesis CNS lesions, early morphodiagnostic comprehensive, effective treatment, reduce disability and mortality myelitis and encephalomyelitis.

**Keywords:** encephalitis, myelitis, perivascular and pericellular edema, ozone, glial cell, microcirculation, pathogenetic therapy.

**Introduction.** A special place among the infectious diseases of the CNS occupies encephalitis and myelitis in children. In re-

cent years there has been a significant increase in the incidence of encephalitis and myelitis, with the number of patients with compli-



cated forms and subsequent disability reaches 30–45%. The mortality rate is 20–35% [1; 3; 6].

Modern methods of investigation such as MRI have high diagnostic value in the study of myelitis and encephalomyelitis, but revealing their neuroimaging features, depending on the etiology in children is practically unknown. As there is no differentiated approach to the treatment, while traditional treatment includes pathogenetics and causal treatment, symptomatic agents, as well as remediation activities. As for the causal treatment, it often turns out to be impossible, as is not always possible to specify the leading etiopathogenic factor. All the more so, specific treatments for viral encephalitis and myelitis (which take 45–55% of all lesions of the central nervous system) are not yet exist [2; 4; 10].

One of the methods of treatments, the use of which is possible in the acute stage, and the recovery stage is ozone therapy [7].

In our opinion OT must take place in the treatment of encephalomyelitis, myelitis, which is dictated by a number of positive properties of ozone: germicide, viral (antiviral) and fungicidal (antifungal) activities, immunomodulation (small doses stimulate the immune system, long — suppressed), the effect on the oxygen budget and metabolism, homeostasis system restore, restore blood oxygen, the optimization of pro- and antioxidant systems, restore microcirculation and peripheral circulation, optimization of homeostasis, stimulation of hematopoiesis, the activation of production of biologically active substances, the optimization of the metabolism of biological substrates of carbohydrates, proteins, lipids (bioenergetic, biosynthetic effects), analgesic, anti-inflammatory, detoxification, fibrolitic action [7; 8; 9].

The proposed scientific research is devoted to solving problems identifying morphopatogenesis of CNS lesions, early complex

morphodiagnostic, effective treatment, reduce disability and mortality from myelitis and encephalomyelitis.

**Aim.** To study pathologic changes in the brain and spinal cord in the experiment with the subsequent development on the basis of data obtained by new approaches to complex pathogenetic therapy.

**Materials and methods.** To study the morphological picture of the origin and development of inflammation (myelitis and encephalomyelitis), an experimental study on 110 laboratory rats weighing 150–200 g Under thiopental sodium anesthesia in a dose of 50 mg/kg 20 animals lumbar puncture will be made with the introduction of CSF from patients infected children. In this part of rats (n = 10) remains intact and is used as a control group.

The model of acute myelitis and encephalomyelitis were reproduced on a modified procedure Nozdracheva AD (year 2001). The first series (I group, n = 40) — the processes studied inflammatory reactions in animals with experimental encephalomyelitis and myelitis, which will be packed with 5 pieces on 2, 5, 9, 14 hours. The second series (II group, n = 20) — animals receiving the conventional treatment for 10 days will be scored on the 14th day. The third series (III group, n = 20) — animals treated with conventional treatment and intravenous ozonoids, scored on day 14. The fourth series (IV group, n = 20) — animals receiving only intravenous ozonoids, scored on day 14.

**Results and discussion.** The results of morphological brain studies in the early period (3–5 days) after the inflammatory process modeling showed that in the affected hemisphere is determined by the focus of inflammation, exciting the deep layers of the cortex, periventricular white area of the hemisphere. Directly around the inflammatory focus brain tissue is loosened, and the vacuolated cells depleted due to swelling of the brain substance.

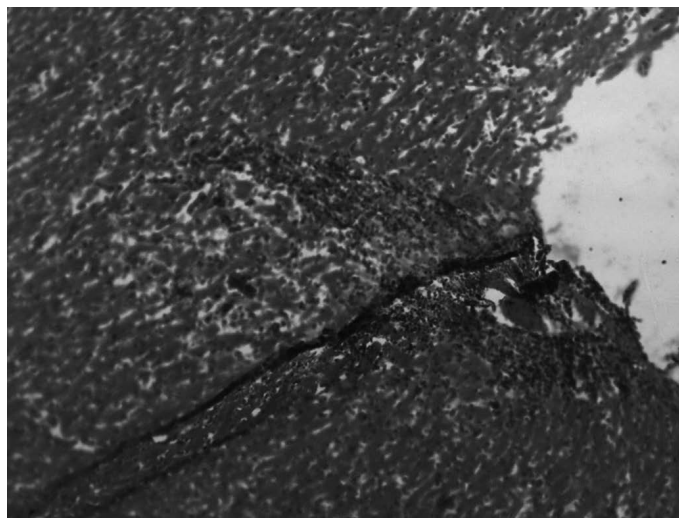


Figure 1.



Figure 2.

In 6–12 days after the inflammation in the affected areas of the brain are neurons, mainly in the state of swelling, lyses and disintegration. Inflammatory focus around glial cells, unlike neurons are located in the activation state, proliferation and hyperchromasia,



Figure 3.

On inflammation initially reacted arterioles affected area immediately adjacent to the site of destruction pronounced vasodilation with an increase in capillary blood flow that is morphologically manifested expansion of the lumen of arterioles, breaking some of them to form secondary foci of hemorrhage, as well as thinning and straightening of the structural elements of all layers of the wall (Figure 3).

although also vacuolated cytoplasm. In the center of inflammation observed decrease the volume of brain tissue, hemolysis, on the periphery of the macrophage reaction (Figure 2).

In remote areas of the brain hemorrhage from the hearth to the experimental period are also stored swollen and minor destructive changes. On the day of the experiment 15–17 nerve fibers are subjected to focal and diffuse disintegration of places. This distal branching of nerve fibers completely lysed with the development pattern of diffuse swelling and lysis of myelin structures (Figure 4).

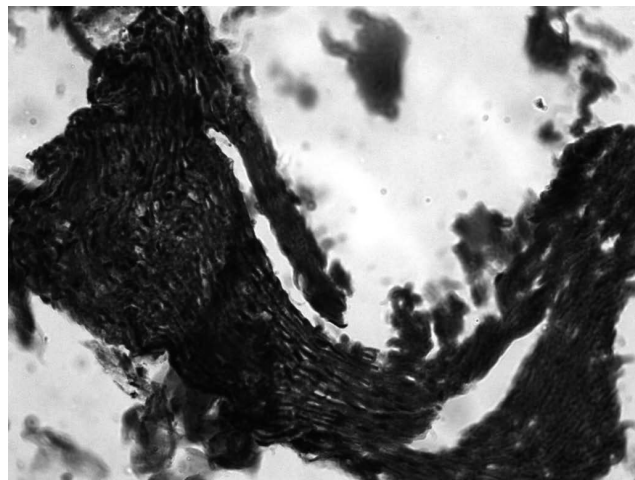


Figure 4. After 31 hours from the beginning of the infection. At the site of inflammation play, formed coarse-fibered connective scar tissue. Coloring: hematoxylin-eosin. X: ok.10, ob.20 (increase – 200 times).

Changes are expressed in glial cells, and propagation of its advent among these degenerative forms. Proliferative processes by glia have the focal or diffuse nature. With long-term course of the disease is observed decay and encephalomalacia brain tis-

sue in inflammation, leukocyte infiltration with perivascular and pericellular edema surrounding nerve tissue. These changes occur at 20–21 hours post-infection the experimental animals.

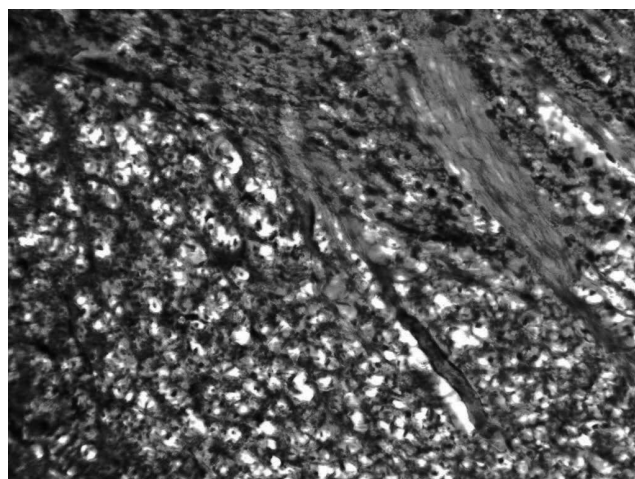


Figure 5.

At 55–60 hours around the source of inflammation in the brain tissue of developing common and intracerebral perivascular inflammatory infiltrates of macrophages, microglial origin. These changes are completed with the development of secondary complications such as focal and diffuse gliosis nervous tissue. In some parts of the glial tissue adhesions are formed passing into coarse fiber scars (gliosis, neuroglial sclerosis) (Figure 5).

The results of morphological examination of the spinal cord in the early period (10–12 days) after the simulation of the inflammatory process showed that in the affected area formed the focus of inflammation, spectacular gray and white matter of the spinal cord. On inflammation initially reacted arterioles damaged area. Around the vascular tissue of the spinal cord loosened and swollen, there is the proliferation of glial cells and isolated lymphocytes and

monocytes. In remote areas of the brain from inflammation focus on the 13–14 day of the experiment are also saved swollen and minor destructive changes (Figure 6).

At 15–17 hours after inflammation in the affected area of the spinal cord neurons are located primarily in the state of swelling, lysis and disintegration. With this in the art neurons present with varying degrees of structural and functional changes, the severity of which decreases from the central to the peripheral zones of necrosis hearth.

On day 30 of inflammation revealed uneven plethora of vessels, a slight perivascular edema pericellular and spinal cord material. As in the brain and spinal cord develop secondary complication as diffusely — focal gliosis nervous tissue. In some parts of the nervous tissue of the spinal cord is formed by the adhesive process (Figure 7).

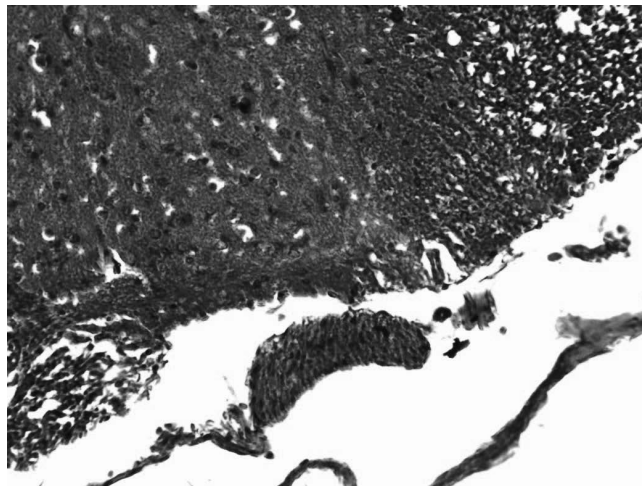


Figure 6. Irregularly full-blooded little vessels and perivascular edema pericellular spinal cord material. Determined by fibrotic scar

In the experimental group I were treated at different times from the onset of the disease in the traditional way by 15–17 days and continued until day 31 of the disease. In these terms against the background of positive clinical dynamics in the morphological pic-

ture is also observed positive changes: reduce the size of perivascular edema and peritselyulyarnyh nervous tissue. In the vasculature it has been a slight expansion of the lumen of blood vessels. Can not find the glial cells and scar process cortex of the brain (Figure 8).

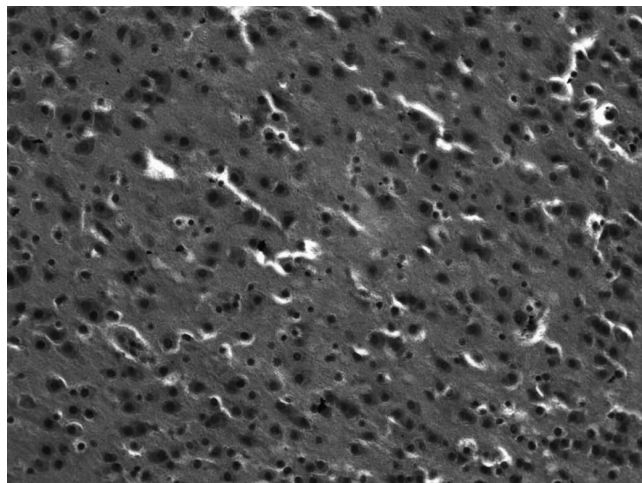


Figure 7. After 19 hours from the start of treatment. On gistopreparate determined by the expansion of micro, small and perivascular edema peritselyulyarnyh nervous tissue. Colouring: hematoxylin-eosin. X: ok.10, ob.20 (increase — 200 times)

In 45–46 hours (15–16 hours of treatment) microscopically detected in brain tissue following morphological pattern: in the cortex and glial cells of the brain are found on the small size of vascular and perivascular cell infiltrates vascular connective apparatus hematogenous and local origin. The glia sections occur as a loosening and negligible intensity proliferative processes, which leads to the formation of small

adhesions. Reduces the size of peritselyulyarnyh swelling of nerve tissue. Formation of a large number of small adhesions leads on the border of the frontal, parietal and temporal lobes to individual scars small density.

Research traditional therapy started at 10–12 days of the disease showed that in the affected area to reduce inflammation focus in the gray and white matter of the spinal cord.

On day 30 of treatment unit vessels microvasculature in a state of irregular blood supply. In the matter of the spinal cord on a background of mild proliferation of glial cells and isolated lymphocytes

and monocytes are soft spikes, identified areas with smaller and perivascular edema peritselyulyarnymi (Figure. 9).

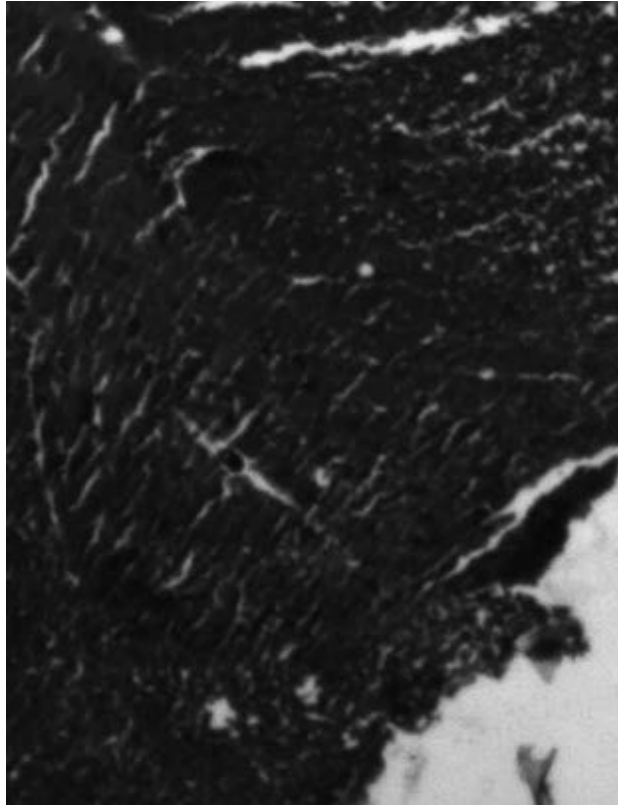


Figure 8. Nerovnomerno full-blooded little vessels and perivascular edema pericellular spinal cord material. Determined by fibrotic scar

Smears of the brain when traditional therapy in combination with ozone therapy. It gives more ranneyu positive clinical and morphological dynamics for 45 hours in the cortex and glial brain there are isolated vascular and perivascular cell infiltrates hematogenous and local origin. In the nervous tissue peritselyulyarnye edema are rare and

have small sizes. The vasculature vascular lumen extended slightly. In comparison with the morphological pattern after conventional therapy reduced the number of vessels in which endothelial wall has desquamation. Against the background of the use of ozone therapy are observed proliferative processes in the crust and glia (Figure 10).

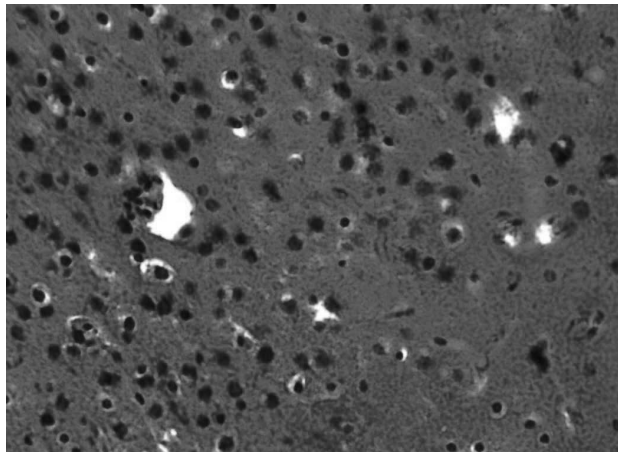


Figure 9. In the 15 hours since the beginning of the treatment. On histopreparate determined microvascular expansion, migration of leukocytes, macrophages and the formation of weakly expressed perivascular edema and pericellular nervous tissue. Colouring: hematoxylin-eosin. X: ok. 10, ob.20 (increase — 200 times)

For 50 days in the cortex and the brain glial cells reduces the number of vascular and perivascular cell infiltrates vascular connective apparatus hematogenous and local origin. Pericellular nervous tissue edema is also significantly reduced in size. The blood vessel lumen glia slightly expanded in areas adjacent to the cortex. In the cortex, and brain matter after this treatment is not detected scar process. This suggests that our

proposed method of treatment more effective, even in the later stages of treatment.

It is also noted the positive dynamics in the spinal cord substance occurs 2–3 days earlier. Identifies individual capillaries lumen which is not completely filled with the blood formed elements, and around them there was a slight perivascular edema and peritselyulyarny spinal cord substance (Figure 11).

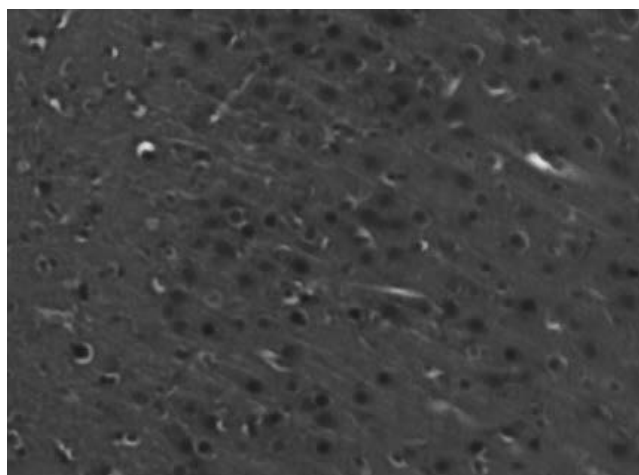


Figure 10

In the matter of the spinal cord is not detected the proliferation of glial cells and lymphocytes and monocytes are no spikes. However, in the white and gray matter of the spinal cord there are areas with low and perivascular edema pericellular.

In order to determine the effect of ozonoids on the structure of rat brain and spinal cord material. In the control group of five rats was administered intravenously ozonoids. The study of morphological picture of the introduction ozonoids revealed no differences in the structures of the substance of the brain and the spinal cord of rats compared to control animals not treated with ozonoids.

**Conclusions.** In the middle of inflammation in the damaged brain tissue react glial cells and the cell walls of the microvasculature. When playing an inflammation in the brain tissue in the early stages of developing the original edematous phenomena associated with the activation and generation of factors damage glial cells and vascular wall cells. Following this fast-destructively joined predominance of necrotic changes in neuronal and glial cells. These destructive-necrotic changes in inflammation and in the circle are developing regenerative response of inflammatory reactions in the form of expansion

vessels, the migration of leukocytes, monocytes in the hearth of destruction, proliferation of microglia to the transformation on macrophages, the formation of inflammatory cell necrosis demarcation around the shaft. When inflammation of the spinal cord at the early stages of developing primary edematous effects associated with damage to glial cells and vascular wall cells. Thereupon rapidly predominate destructive-necrotic changes in neuronal and glial cells.

Against the background of traditional therapy started in the early stages in the morphological changes found in the picture better than treatment, started in the later periods.

Against the background of traditional therapy for myeloma, a positive trend in clinical and morphological picture is earlier than when conventional therapy encephalomyelitis.

Traditional therapy started even later date in conjunction with ozone therapy provides a positive morphological dynamics in the nervous tissue of the brain is already 21 days of treatment.

In conventional therapy combined with ozonoids of myelitis, positive morphological dynamics occurs earlier than when conventional therapy myelitis.

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## Effect of genetically modified product on reproduction function, biochemical and hematology indexes in experimental study

**Abstract:** The aim of the study was to investigate the effect of genetically modified (GM) foods on alteration of hematological and biochemical parameters and effect on reproduction at experiment with white rats. It was found the difference between the tested and control groups: as the blood parameters as well the reproduction indexes of test group of animals were in imbalance with studied biochemical and hematological parameters of control animals. There was observed effect of GM soy product on reproduction cycles of first generation of experimental animals.

**Keywords:** genetically modified, soybeans, rats, blood indexes, reproduction.

**Introduction.** The aim of the study was to assess the medical and biological safety of product which obtained from GM-soybeans. We carried out the series of test with laboratory white rats to investigate the effect of soy GM-product on both a) biochemical and hematological blood indexes and b) reproduction functions. Recently there were a few studies conducted by independent scientists and not interested companies to study any negative effect of GM products on laboratory animals. Therefore, such kind of the study on GM product has one scientific value [4; 6].

**Materials and methods.** Experimental group were fed by general diet and during 30 days with adding GM soy flour in dose 0.003 g per rat, while the control group received a general diet without GM additives. After pairing experimental and control groups we carry out the desiccation procedure of females (n=15 — test animal, n=15 — control animal) at 16–17th day of their gestation and recorded number of live embryos and the presence of dark homogeneous cells (dead embryos) for each female [3].

Peripheral blood was obtained from the carotid artery of laboratory animals, and blood tests were carried out according to conventional methods [1; 2]. Statistical analyses were performed by standard method of variation statistics.

**Result and Discussions.** It should be noted that prior to the beginning of basic GM experiment to fed laboratory rats in test

group diet was added dose of GM soy flour as 0.02–0.03g per one rat. However, after 10 days of this diet, into the male' testis was observed both: the hy-postases and reddening; because of the fact, fed dose was reduced in 10 times and consisted 0.003 g.

Result of rat dissection procedure showed that indexes of post-implantation mortality was zero at each of dissected female of experimental and control; number of mature embryos found in female uterus consisted of 5–9 and it was not significantly different for test and control groups ( $P < 0.05$ ).

In females of control group was observed fertility rate as 100%, compared to females of test group fertility rate consisted 60%. Besides, in females of test group compared to control were observed following features: a) the later term of pregnancy (estrus began after 10–14 days of pairing period, while for control females estrus started on 1–6-th day after pairing); b) a prolonged time to becoming the birth rates (up to 2 days) compared to control females (1h).

In addition, the following index of "troubled" bearing of embryos for test group female was a higher rate of mortality of pregnant females consisted 50%, while in the control group mortality of pregnant females was 20%.

During of anatomical dissection of test and control rats (mals and females) it was found for tested animals that organ of digestive system, especially the liver and spleen was exposed by noticeable

the anatomical and pathological changes in weight, size, color and texture compared with control group animals.

Furthermore, biochemical result of blood of test animals was significantly differed from control groups for altered indexes: it was decreased in 1.3 times of creatinine and in 1.7 times of associated bilirubin ( $P < 0.05$ ). Also there was observed a significant decline of such biochemical indicators of blood tested animals: in 1.5 times of AST, 1.4 times of ALT, 1.4 times in urea and in 1.4 times of glucose relative to control ( $P < 0.05$ ).

Moreover, for biochemical indexes it was found that in the treated by GM product group, was increased as total protein value in 1.1-fold, as well the free bilirubin indices risen in 1.5 times relation to the control ( $P < 0.05$ ).

The result of blood hematological indexes shown that treated by GM soybeans group was reducing of hemoglobin in 1.2 times:  $63.16 \pm 7.06$  g/L and  $75.66 \pm 8.46$  g/l for test and control groups simultaneously;  $P < 0.001$ ). The number of leukocytes also was decreasing in 2.6 times ( $1.95 \pm 0.36 \times 10^9$ /L and  $5.05 \pm 3.59 \times 10^9$ /L for test and control groups simultaneously;  $P < 0.001$ ).

At the same time into blood of rats from the test group was observed: a) the emerged in red blood cells of corpuscles Jolly ( $1.9 \pm 1.3\%$ ) and b) toxic granularity of leukocytes ( $1.9 \pm 1.3\%$ ), which were not observed in control group of rats. The emergence of the toxic elements (corpuscles Jolly in erythrocytes and leukocytes toxic granularity) indicated the pathological process in animal body, and reduction of antitoxic characteristics of liver may be taken into account as evidence of decreasing in the immune resistance of organism.

For both groups was practically not found any traces of formation and/or development of tumor. In internal organs (heart, lungs) was not detected any abnormalities compared with control rats at their look and size as.

**Conclusion:** Certainly, GM products have great advantages over the original one by plan-ting. However, in this study we fed animals by GM soy additive as 0.003g per rat during 30 days and noticed two significantly effects on both: reproduction functions and immune system of treated by soybeans animals. The study confirms once again the statement of investigators that for each a new obtained by genetically engineered plant product must be subjected to careful investigations, which carried out by independent research groups [5; 7].

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## Morphology of neuroendocrine-immune system of jejunum in early postnatal ontogenesis

**Abstract:** The morphology of the nervous, diffuse endocrine and immune apparatus of jejunum of 20 day old rabbits were comprehensively studied by using neurohistological, general histological and ultramicroscopic methods and found their morpho-functional improvements because of transition to new quality nutrition at this age.

**Keywords:** jejunum, local regulatory apparatus.

**Introduction.** Study ontogenesis of the jejunum [2; 3; 4; 5] and its regulatory structures [1; 6] attracts attention of the investigators in the last years. However the complex study of regulatory structures of the jejunum wall in the period of the early postnatal ontogenesis which have a certain importance in order to elucidation their integrative role and interaction in the period of morphofunctional adaptation to the new existing and nutrition status have not enough studied.

**Aim of investigation.** The complex study of morphology of the local regulatory structures of the rabbits' jejunum in the period of adaptation for the qualitatively new nutrition method.

**Materials and study design.** Morphology of the intramural nerve, diffuse endocrine apparatus and immune structures of jejunum of 16 rabbits of 20 days of age have been studied. Fixation of material in formalin and embedding material in paraffin has been

carried out by the general accepted method. Paraffin sections were colored by the use of hematoxylin-eosin method. Cryostat sections of the material fixed in 12% of neutral formalin have been processing by silver nitrate according to the Bolshovskiy-Gross and Campos methods. Cryostat sections from wandering material have been processing by the solution of glyoxylic acid in order to determine adrenergic nerve structures and fluorescent endocrine cells. It is needed to mention that in specimens processed by Grimelius method immune structures are clear and very well determined. Specimens processed by glyoxylic acid have been examined and photographed on digital camera through luminescent microscope LUMAM-IZ with the use FS.1-6 and FS.1-4 filters. The structures' density was determined on Standard Square in the vision field of microscope.

**The results of the own investigations.** The study of morphology of the intramural nerve apparatus of jejunum of rabbits of 20 days of age showed that in this period of postnatal development nerve elements of

jejunum have been characterized by well apparent typological differentiation of nerve cells. Increasing amount of functionally "matured" nerve cells (they used to have the well-developed neurofibrillary apparatus, axons are differentiated, tigroid substance has clumpy appearance and nucleus is localized in the center of the cell) has been determined in the ganglions of intramural nerve plexuses. Number of neuroblasts in ganglions is decreased; however in each intramural ganglion it can be determined the certain amount of them. Nerve cells of the first Dogel's type (neurocytes with long axons) shows high sensitivity to silver nitrate. Hyper-impregnated and comparatively thick axon of these cells is often entered to the composition of nerve column and until certain distance is sharply distinguished from the left nerve fibers of ganglion by thick caliber and intensive coloration. Dendrites are usually ramified inside intramural ganglion. Intramural ganglions are clearly limited and localized at the same direction as nerve column which also well impregnated and determined in the comparison with previous ages (figure 1).

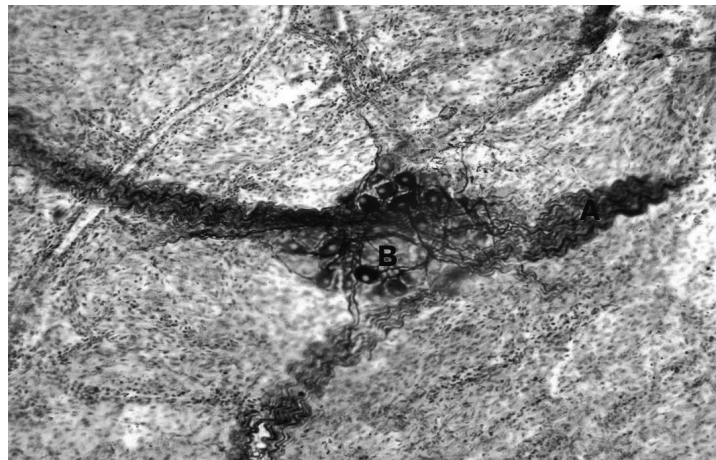
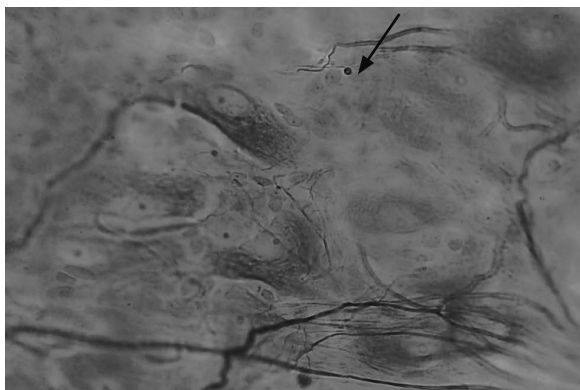


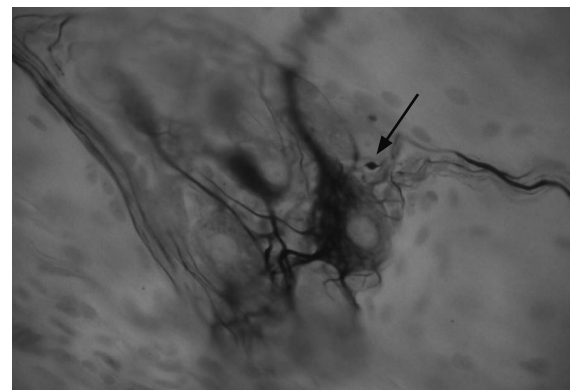
Figure 1. Intramural nerve ganglion of subcutaneous plexus of jejunum of rabbit of 20 days of age. Fascicles of nerve fibers (A) and nerve cells (B) of the different degrees of impregnation can be seen. Bolshovskiy-Gross painted by aluminous carmine. Ob. 20, ok. 10

Some ganglions contain a little amount of nerve cells, but it is found ganglions containing several ten nerve cells. Effectors of nerve endings on the body of nerve cells in the form of pericellular apparatus around nerve cells or separated "rings" localizing on the

body of the nerve cell of the first type, sometimes in the interneuronal cavity can be repeatedly determined at this age. Sometimes transitory synapses on the body of neurons of the first type can be observed (figure 2).



A



B

Figure 2. Nerve ending in the form of "ring" (A) and transitory synapse ending (B) on the long-axon neurocytes of jejunum of rabbit of 20 days of age. Impregnation by Campos. Ob.40, ok.10

Adrenergic nerve fibers as well as the other nerve structures at this age are clearly formed and as if it happened morphologic "leap" in the structure and differentiation of these nerve structures, they are accurate and fluorescence degree is high (figure 3). During the analyses of the more light sections and thin areas of the total specimens we have determined phenomenon which should be taken into consideration, i. e. in fact that adrenergic perivascular plexus is accompanied

branches of arteries before their bifurcations and it is absent in capillaries. Fluorescent endocrine cells of the jejunum of the rabbits at this age have been clearly determined in the epithelium of crypts and fringes. Distribution density of these endocrine cells in the jejunum of the rabbits of 20 days of age was on average  $7,2 \pm 0,34$ . They often have rounded or oval with elongated apical part form reminding fluid drop. Process of cells' extrusion of secretion could be seen in some cells.



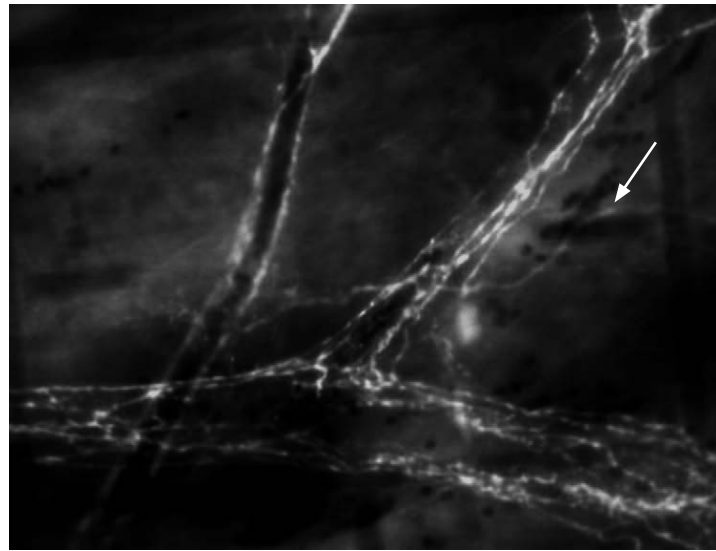


Figure 3. Perivascular adrenergic plexus around the arteries of different calibers of jejunum of rabbit of 20 days of age. Total specimen. Processing by glyoxylic acid. Ob. 20, gomal 3

Therefore, to 20 days of age postnatal ontogenesis intramural nervous apparatus of jejunum is morphofunctional differentiated. The components of the adrenergic nervous apparatus provided enough neurotransmitter. Argyrophil endocrine cells of the jeju-

num in rabbits of this age are located in the epithelium of the crypts and villi. Electron microscopic study of endocrine cells showed that in this period in their cytoplasm secretory granules is clearly visible, which often found on basal parts endocrinocytes (figure 4).

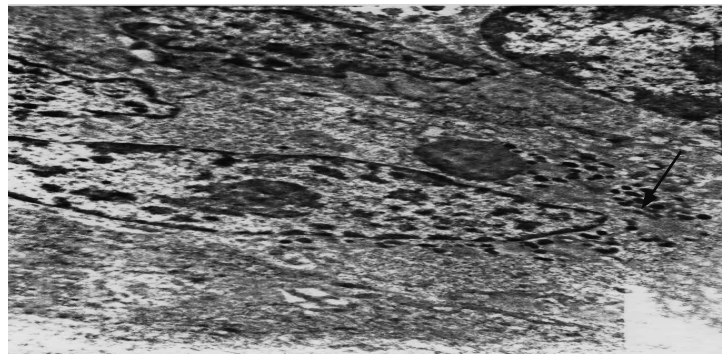


Figure 4. Localization of major polymorphic granules on basal pole APUD cell (arrow). Electron microphotograph. Inc. 6000

Immune wall structure of the jejunum of rabbits of 20 day of age is presented in separate clusters of lymphoid tissue, diffusely located lymphocytes and intraepithelial lymphocytes. Submucosal wall of rabbits' jejunum of this age have separate clusters of lymphoid tissue, a part of which contains more mature lymphocytes, in contrast, from those structures of rabbits jejunum of previous age.

The central part of the lymphoid aggregates is lighter and contains lightly colored, relatively large cells. The peripheral part is painted basophilic. This testified about the appearance of reactive reproduction center in these clusters. However, lymphoid clusters have no clear boundaries. The average diameter of lymphoid clusters of jejunum of rabbits of 20 day of age on averaged was  $273,0 \pm 2,94$  mcm.

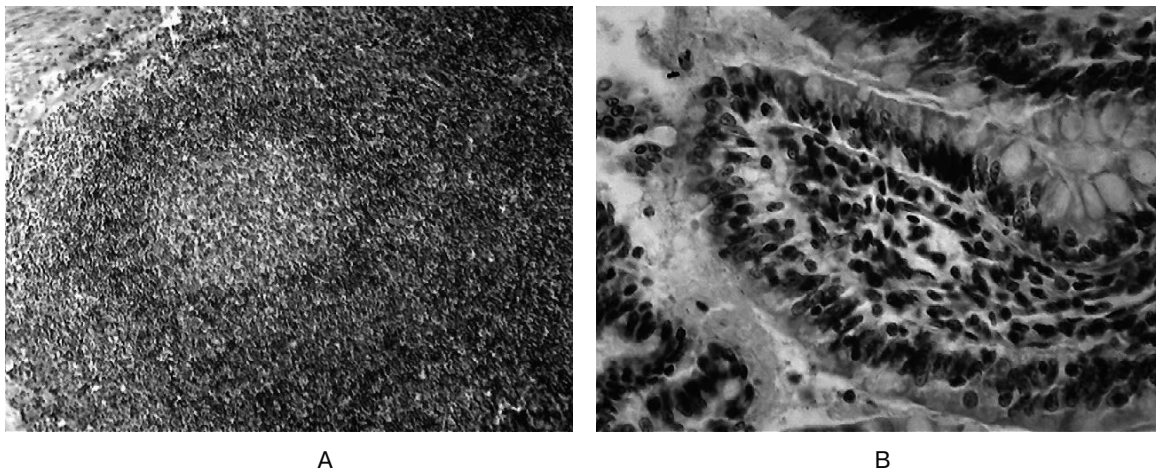


Figure 5. Lymphoid nodule with emerging light center (A) and high density of interstitial lymphocytes in the stroma of the villi (B) of the mucous membrane of the jejunum of rabbit of 20 days of age. Staining by hematoxylin-eosin. Ok. 10, ob. 20

At the base of the villi in the submucosal basis, also there is a high density arrangement of interepithelial lymphocytes, unlike from parts of submucosal basis of crypts (figure 5). In rabbits of 20 days old, sharp increase in the amount of diffusely located lymphocytes has been observed. They are located in the lamina propria and in the submucosal basis of the jejunum. Intratissular lymphocytes was significantly more in the stroma of villi ( $12,3 \pm 0,16$ ), in contrast to the lamina propria of the region of crypts ( $7,06 \pm 0,12$ ).

The base of most of the villi because of the high density of intratissular lymphocytes consisting mainly of a large number of mature lymphocytes has dark basophilic coloration. These changes seem to be associated with a change in the rabbits' diet and participation villi in the digestion process.

In the epithelium of the mucous membrane of the jejunum rabbits of 20 days of age contain more intraepithelial lymphocytes. They are mainly found in the epithelium of the villi and are lo-

cated both above and on the level of mucosal epithelial nuclei. Intraepithelial lymphocytes mainly consist of mature lymphocytes with large basophilic colored nucleus of rounded shape. These data also indicate the active involvement of the villi epithelium than that of crypts in the digestion process of the food of a new character which differs in composition from the food of rabbits of 10 days old.

**Conclusion.** Studying the local immune apparatus jejunum of rabbits of 20 days of age of early postnatal ontogenesis, we can conclude that the immune structure of the jejunum of this age differ from previous ages, both in quantitative and qualitative terms, and they are more formed. This is apparently due to the transition of the rabbits of this age to the qualifiedly changed nature of the food (mixed feeding begins at this age). Thus, all structures of the neuroimmuneendocrine regulatory apparatus of jejunum of 20 day-old rabbits are morphofunctionally formed.

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## Age morphology of immune structures of rabbit jejunum in the period of the early postnatal ontogenesis

**Abstract:** Based on general histological and histochemical methods of investigation we have studied the comparative morphology of immune structures of jejunum in young rabbits in the different periods of early postnatal ontogenesis. The study has determined presence of morphological and morphometric differences between them, although the general principles of their structure has been identical. The localization density of intra-tissue lymphocytes has demonstrated intensive increase until 20 days of postnatal ontogenesis.

**Keywords:** Jejunum, immune structures, age morphology.

**Introduction.** The functioning of the organs of digestive system after birth of the animals led to the some adaptation-morphologic changes of the immune structures, although the general appropriateness and principles of structural organizations were still without changes. In the realization of die immune reaction it is important to know the development lymphoid tissue in ontogenesis (Zavarin, 1985). There have some scientific works dedicated to the study of the immune structures of jejunum in the normal condition

(Novakovskaya, Archakova, and Gurin, 2004; Chava, 2004, 2008) and during the influence some factors (Azizova, Hasanov, and Tulemetov, 2004; Tuhtaev, Azizova, and Hasanov, 2004; Chava, 2006; and others). Although in die structure of the immune structures there have numerous parallelisms, perhaps in each class of vertebrates complication of this organization could be reached independendy (Gorishina and Chaga, 1990). Jejunum is the important part of the digestive tube where the final chemical processing of chime

and absorption of nutritious substances in the organisms occur. Perhaps the morphology of the structural reorganization of the immune structures of jejunum in mammals in the period of the early postnatal ontogenesis is a problem which has not studied yet. Determination of the structural features of morphology of the immune structures of jejunum in animals in the different periods of postnatal ontogenesis is the actual problem. Taking into account the above mentioned we studied morphology of the local immune structures of the rabbits' jejunum in the different period of the early postnatal ontogenesis. Elucidation of this problem could have significant theoretical and applied importance in the basis of organ's immune status in these periods and in regulate of die- therapy in the different diseases of the jejunum.

Therefore, the study concerns age morphology of immune structures of rabbits' jejunum in the period of the early postnatal ontogenesis.

**Materials and study methods.** Materials for our investigations were the jejunum of the young rabbits of 1, 10, 20, and 30 days of age. Material was received just after slaughter of the animals under the etaminal- sodium narcosis. jejunum was gathered as roulette and in this shape it was fixated in 12% of neutral formalin. Histological processing of the materials and giving a wash of paraffin was performed according to generally accepted method. A series of paraffin cuts were painted by use of methods hematoxylin-eosin, Van-Gizon, Mellory and it was impregnated by use of argentums nitrogen by Grimelius. During the use of the last method morphology of lymph nodes have the most clearly determined. Review and photocopies was performed by use of microscope Leica microsystems Wetzlar GmbH (Portugal).

**The results of investigation.** Immune structures of jejunum of the young rabbits are the most formulated. Basically, it is represented by the diffuse localized intra-tissue lymphocytes and its accumulation and formed nodes, and also by insignificant accumulation of these nodes which could rarely happen. The diffuse localized lymphocytes were settled submucosal basis and proper mucous plate. In the other layers they were determined in the composition of the connective tissue around blood vessels and in the composition of die stratum of connective tissue between the other tissue structures. The localization density of intratissue lymphocytes could have tendency to increase to the direction of lumen intestine. The most its density was noted around the crypts and in the composition of the intestine villas. Sometimes the separate lymphocytes we could determine in the composition epithelium of the mucous membrane. They usually hyper chromed and localized in the different distances from the basal membrane and sometimes in the nearest epithelium surface. In very seldom cases we could determine single lymphocytes and in die crypt lumen, around its epithelium. The single lymph nodules were localized mainly in the proper mucous plate. This part of the mucous membrane is stick out in the lumen of intestine. The outpouching form could be different depending on the form of lymph nodules, but most often it has domelike form. In all cases around protuberances it has deep grove surrounding outpouching which covered by intestine epithelium. The bottom of the grove could reach to the muscular plate. Sometimes from the bottom of the grove it was formed the crypts which can reach to the muscular plate. In rabbits of the 10 years old it was determined small accumulations of lymph nodules. These accumulations consisted of a few lymph nodes. The most accumulations of die lymph-nodules by the size and by the amount it was determined in the wall of jejunum near the ileum and the duodenum. Such accumulations in the wall of the middle part of the jejunum were rarely noted. In the location

of these accumulations it was absent the muscle plate of the mucous membrane and submucosal base of the intestine was combined with the proper mucous plate. Consequently the localization territory of these accumulations was captured the proper mucous plate and submucosal base of the jejunum. These accumulations consist of the near located nodules, between them it has a small distance littered with lymphocytes. Around every nodule it has an epithelial grove from the bottom from which it began intestinal crypts. The bottom of these crypts could reach muscular tunic of the intestine wall. It urns observed the cases when the crypts passed through the territory of die nodule. The amount of crypts around the nodules was different, and on the flatness cuts their cross-cuts surrounded the lymph nodule. The size and morphology of the lymph nodules was identical with the single localizing lymph nodules. They have good expressed germinative centers (20–30 days). We have determined special epithelial tubules which connected the intestine lumen -with single localizing lymph nodule or with the accumulations of them. In one case we could determine a longitudinal cut of this tubule for a significant distance. Epithelial channel differs from the cross-sectional cut of die intestine crypts by the relatively big diameter. The epithelium covering the channel differs from the crypts epithelium and fibers by the relatively lower height of epitheliocytes and the absence of goblet cells between them. The amount of epithelial tubules in the accumulations of lymph nodules was different. We have not determined the relationship between amount with accumulation size and the amount of nodules. Quite often near the single lymph nodule we could determine two epithelial tubules, sometimes among the big accumulations of nodules it was determined a single epithelial channel. Diameter of these epithelial tubules was also different and it was not depended on the conditions which was discussed the above. Tubule blindly begins from the accumulation or from the single lymph nodule. In this place it is sharply enlarged and then it is narrowed like excretory ducts of glands and it is opened to the intestine cavity. We have determined that the character feature of the single localizing lymph nodules of the young rabbits' jejunum wall at 20 days of age was the presence of the deeper grove like epithelial bottom around the nodule. It is differentiated the lymph nodule which invaginated in the intestine cavity from the neighboring parts of the mucous membrane. The character feature of the lymph structures of the jejunum of 20 and 30 days of age is the appearing of the small accumulations of lymph nodules and epithelial tubules which ate connected these accumulations with the intestine cavity. Determination of the localization density of the diffuse localizing intra-tissue lymphocytes in the proper mucous plate of the jejunum in the ontogenesis have showed that in rabbits in the process of the early postnatal ontogenesis it has occurred the increase of the spreading density of the intra-tissue lymphocytes. In this case the most increase is occurred before 20 days. As you can see from the diagram before 20 days the increase of the localization density of the intra-tissue lymphocytes is significantly high from the moment of birth until 10 days in general in 32% in the contrast with newborns and until 20 days in general in 21% in the contrast with the rabbits at the 10 days of age. Beginning from the 20 days of age the increasing of localization density of the intra-tissue lymphocytes was less notable. This tendency was observed basically on the all structural components of the mucous membrane and submucous base of the rabbits' jejunum wall (fig. 1).

Titus, the immune structures of the jejunum wall in rabbits of the different period of the early postnatal ontogenesis were identical, they differed by the some morphological and morphometric parameters. In the latest periods it was determined the small accumulations

and deeper localized lymph nodules. They have special epithelial tubules connecting them with the jejunum lumen. In rabbits at the early periods of postnatal ontogenesis the immune structures of the jejunum was presented by the diffuse localized lymphocytes in the

proper mucous plate and nodule like accumulations surrounding by the significantly deeper crypts. The localization density of the intra-tissue lymphocytes was intensively increased until 20 days of postnatal ontogenesis and then the increasing temp was less.

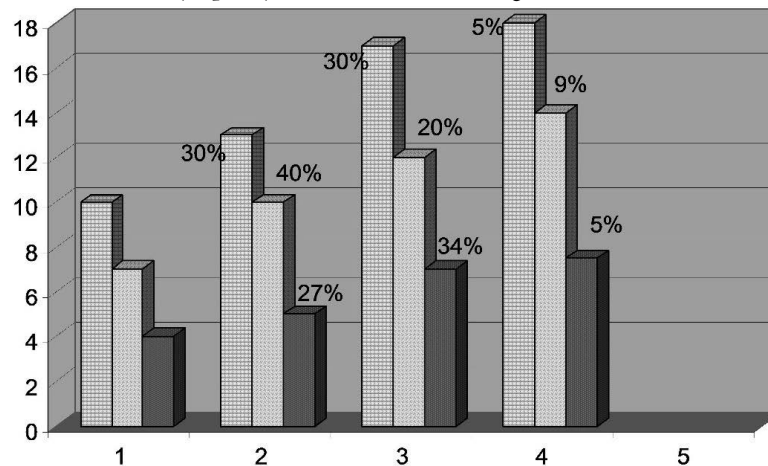


Figure 1. The spreading density of intra-tissue lymphocytes in the composition of the structural components of the rabbits' jejunum wall in the different ages.

Note: Row 1 – in the composition of submucosal membrane; Row 2 – in the composition of villas; Row 3 – in the composition of crypts. 1 – Newborns; 2 – Rabbits at the age of 10 days; 3 – Rabbits at the age of 20 days; 4 – Rabbits at the age of 30 days. Figures in the columns are the indexes of the growing percentage in the comparison of the previous age.

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## Morphology of neuroendocrineimmune system of jejunum in early postnatal ontogenesis

**Abstract:** In this study we compared research children's with developed educational preventative dental work prepared for use of fixed orthodontic appliances, aimed at improving the sanitary-hygienic knowledge of children, teachers and parents, to normalize the hygienic condition of the mouth and reduce the prevalence and the intensity of dental caries.

**Keywords:** Dental caries, fixed orthodontic appliances, index OHI-S, index «KIIY» (κ- carious teeth, π- dental filling material, γ- extracted teeth), and index Fedorov-Volodkina.

### Introduction

Over the last decade, there was a significant reduction in the prevalence of dental caries in children and adolescents [2; 3]. The reasons for this are varied, but the most significant are reduced consumption of sugars, improving the quality of care for oral and dental hygiene, the use of fluoride-containing toothpaste, improving the organization of dental services [8].

In domestic and foreign sources of information are widely considered the organization and evaluation of professional activities aimed at the prevention of dental diseases [1; 4].

The most important and the weakest link in the implementation of the prevention of major dental diseases is hygienic education of the population, dental educational work and training of oral hygiene [5; 6; 7].

Purpose of the study:

Basis for the use of the system of prevention of hard and soft oral tissues to caries in children as criteria for assessing the effectiveness of preventive measures for preparing to use of fixed orthodontic appliances.

### Materials and methods

At the Department of Pediatric Otorhinolaryngology and children's dentistry Tashkent Pediatric Medical Institute developed educational preventative dental work prepared for use of fixed orthodontic appliances, aimed at improving the sanitary-hygienic knowledge of children, teachers and parents, to normalize the hygienic condition of the mouth and reduce the prevalence and the intensity of dental caries in children.

Educational preventive dental program has been implemented for 1 year based on the student clinics number 56. The program involved students in the groups aged 7–9 years.

To analyze the impact of preventive work the children were divided into 2 groups: Group 1–25 children 7–9 years old and group 2–30 children 10–12 years.

Furthermore, for comparative analysis and evaluation of the implementation of dental preventive work we performed dental examination of 20 children aged 7–9 years enrolled in educational institutions of Yunus-abad district, Tashkent, Uzbekistan, among whom any preventive measures and programs have not been conducted. For a comparative analysis, the children were divided into 2 groups: control group 1–10 children of 7–9 years, the control group 2–10 children of 10–12 years.

### Results

Dental survey of children of age 7–9 prior to the implementation of dental preventive work has revealed the following. The prevalence of dental caries in surveyed children 10–12 years was 73.6%, while the index of the intensity of the «KII» (κ- carious teeth, π- dental filling material)  $3.35 \pm 0.63$ . In the structure of the index, «KII» noted the predominance of the component «K» —  $2.67 \pm 0.56$ , the number of seal teeth time was  $0.68 \pm 0.15$ .

Analysis of the hygienic condition of the mouth of surveyed children showed a satisfactory level of hygiene, the average value of the index according to Fedorov-Volodkina was  $1.83 \pm 0.41$ .

In the group of 10–12 years children, the prevalence of dental caries reaches 81.32%, with the defeat of caries in permanent teeth in this age group was observed in 42.31% of children. The intensity of caries of temporary teeth on the index of «KII» equal to  $2.32 \pm 0.49$ , in the structure of the index number of carious teeth is  $1.16 \pm 0.28$ , the number of temporary sealed teeth — 1.18

+ 0.25. The intensity of caries in permanent teeth among children 10–12 years of age was  $0.9 \pm 0.196$ , noted the predominance of the component «K» in the structure of the index «KIIY» —  $0.53 \pm 0.12$ , a component of «II» is  $0.42 \pm 0.09$ , the value of the component «Y» trivial and  $0.01 \pm 0.002$ .

Analysis of the hygienic condition of the mouth of children of 10–12 years showed that the average value of hygienic index OHI-S was 1.91, which corresponds to an unsatisfactory level of oral hygiene.

Primary dental examination of the control group showed the same level of hygienic condition of the oral cavity and the degree of caries of temporary and permanent teeth.

The survey found that the prevalence of dental caries in surveyed children of control group 1 (7–9 years) was 72.5%, while the index of the intensity of the «KII»  $3.05 \pm 0.63$ . In the structure of the index, «KII» noted the predominance of the component «K» —  $2.32 \pm 0.57$ , the number of sealed temporary teeth was  $0.73 \pm 0.11$ . At the same time, there was no evidence of cases of permanent teeth caries in this age group.

Analysis of the hygienic condition of the mouth examined children in the control group 1 showed satisfactory level of hygiene, the average value of the index according to Fedorov — Volodkina was 1.78–0.43.

In the second control group of children (10–12 years) prevalence of dental caries reaches 82.5%, while decayed permanent teeth in this age group was observed in 42.5% of children. The intensity of caries of temporary teeth according to the index of «KII» is equal to  $2.55 \pm 0.63$ , in the structure of the index number of carious teeth was  $1.26 \pm 0.31$ , the number of temporary sealed teeth —  $1.29 \pm 0.29$ . The intensity of caries in permanent teeth in this group was  $1.01 \pm 0.19$ , noted the predominance of the component «K» in the structure of the index «KIIY» (κ- carious teeth, π- dental filling material, γ- extracted teeth) —  $0.67 \pm 0.21$ , component «II» is  $0.34 \pm 0.08$ , there was no ablated permanent tooth (component «Y» is equal to 0).

Analysis of the hygienic condition of the oral cavity of the second control group of children (10–12 years) revealed that the average value of hygienic index OHI-S was  $1.93 \pm 0.45$ , corresponding to unsatisfactory level of oral hygiene.

Repeated dental survey conducted in 1 year in children aged 7–9 years in the observed group was improvement in oral hygiene from fair to good level (the difference amounted to 21.86%), while the control group of the same age level of hygiene remained at a satisfactory level and even there was a slight increase in the index of Fedorov-Volodkina, reflecting the worsening of oral hygiene (the difference amounted to 1.69%).

In the group of 10–12 years, children who participated in the prevention program (group 2) noted the change in the index of Hygiene OHI-S from the poor to a satisfactory level (the difference amounted to 30.89%), in the control group of children of 10–12 years hygiene remains unsatisfactory despite a slight improvement (the difference amounted to 1.69%).

### Discussion

When analyzing the changes in the intensity of caries of temporary and permanent teeth in children and control groups of children participating in the program of prevention after 1 year of observation it was found an increase in the studied parameters, but the degree of increase was different.

The data indicate the effectiveness of preventive dental work carried out among groups of children 1 and 2. The improvement of hygienic conditions: of group 1 children from fair to good level and children of groups 2 with unsatisfactory to a satisfactory level of hygiene.

It should be noted that in children of groups 1 and 2 was not carried out routine oral hygiene in hospitals, changing the structure of the index «KП» and «KПТ» has been achieved by increasing the motivation of parents to preserve the health of the oral cavity and a systematic appeal to dentists.

The data indicates the effectiveness of preventive dental work among children aged 7–9 years and in the group 10–12 years.

### Conclusions

As a result of the preventive dental work for preparation for use of fixed orthodontic appliances in children of age 3–6 and 7–10 years had marked increasing of levels of sanitary-hygienic knowledge, improvement in the index of oral hygiene (at 21.86% and 30.89%) and changing the structure of the index «KП» and «KПТ» by increasing the number of sealed, and reducing the number of carious teeth (in the group 1 component «K» decreased by 36.70%, and «П» has increased by 198.53%, in the group 2 component «K» has decreased by 28.30% and the component «П» increased by 80.95%).

Conflict of interests

Authors have no conflict of interests.

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## Performance level neuron protein in children with infectious-toxic nerve damage in sepsis in infants

**Abstract:** Detection of high levels of serum NRC septic patients early childhood is an indicator of the damaging effects on the nervous system, not only the existence of the prior USC, but also of the septic process.

**Keywords:** Sepsis.

The problem of sepsis in children remains relevant because of the high level preserves sculpt mortality (from 40 to 70%). Accord-

ing to the Pediatrics Clinic RSSPMC MOH Uzbekistan mortality rate from sepsis in recent years amounted to 30% [2; 3].

Despite the fact that the study of the problem of sepsis, the subject of numerous studies in the works does not reflect the relationship of stages of inflammatory and reparative processes in the central nervous system dynamics of biologically active substances of TNF- $\alpha$ , interleukin — 1, 4, 6, prostaglandins, leukotrienes in a cascade of pathological reactions.

It is also important to investigate the role of the initial state of neurological status and comorbidity CNS and VNS. It may be, for example, perinatal nervous system lesions (perinatal hypoxic brain injury: cerebral ischemia or hypoxic-ischemic injury, and intracranial hemorrhage of hypoxic genesis, or hypoxic-hemorrhagic lesions) or the presence of a child in the background TORCH-infection bacterial sepsis with the defeat of the nervous system, affecting the further course of the disease.

So far not defined prognostic parameters of formation of character and severity of sepsis with an infectious-toxic lesions of the nervous system in young children, although it is known that a poor premorbid background, cerebral dysfunction, immune deficiency contribute to the development of adverse Techa-disease. All of the above determines the prospects of research in this area, and is of great scientific and practical interest.

In recent years, as a marker of neuronal damage using defined-concentration neurospecific proteins (NRC) in biologically active liquids: blood serum and cerebrospinal fluid. Protein S-100 is a specific protein-tare astrocyte glia, is a class of proteins other than by charge and molecular weight, but immunochemically identical [5, 6]. A family of protein S-100 consists of 20 tissue specific monomers that form homo- and heterodimers ( $\alpha$ ,  $\beta$ ,  $\beta\beta$ ,  $\alpha\alpha$ ,  $\alpha\beta$ ). Enolase cytoplasmic protein represented by three isoforms:  $\alpha\alpha$ ,  $\alpha\gamma$ ,  $\gamma\gamma$ . The most acidic form enolase  $\gamma\gamma$  specific for neurons, called a neuron enolase (NSE).

Immunohistochemical studies on the monoclonal antibody to  $\gamma$ -monomer of the antigen identified only in neurons that can be considered as a highly specific neuronal NSE marker. NRC concentration depends on the immunological reactivity of the organism, the severity of the inflammatory process, the number of dying cells in the brain [6].

**Objective:** to study the clinical and prognostic aspects of changing the concentration of neuron specific enolase and protein S-100 in the serum of children with infectious and toxic lesions of the nervous system in sepsis in infants.

**Material and methods.** We observed 97 patients with sepsis in children aged 1 month to 1.5 years, who were treated in the department of pathology of early childhood clinic RSPMC Pediatrics Ministry of Health of Uzbekistan. Of these, for the interpretation of the data we were allocated two groups according to the presence and absence of perinatal nervous system (PNS): the main group — patients with sepsis USC (80 patients) and control group — patients without sepsis USC (17 patients). All patients according to age were divided into two groups: the first group included children aged between 1 and 6 months ( $n = 30$  preceding USC and  $n = 9$  without NCSP), and the second from 6 to 12 months ( $n = 50$  USC preceding and  $n = 8$  without NCSP).

The diagnosis of sepsis was based on the history, clinical signs of disease analysis, bacteriological and serological tests.

Neyromarkery studied: identification of protein S-100 and NSE activity carried out by solid phase ELISA using «CanAg» company reagents (Sweden).

**Results of the study.** The examination neuro status during the regular recurrence of cerebral symptoms of sepsis was observed more frequently in the form of a syndrome similar to acute perinatal period disorders: cerebral excitability and cerebral depression. Cerebral symptoms determined syndrome encephalasthenia indicating the prevalence of depression or excitement.

The results showed that 80 (82.4%) patients with sepsis-age children of wounds he had revealed the presence of previous USC, in 17 (17.6%) patients with sepsis had no prior USC.

Next, we performed an analysis of frequency of occurrence of various syndromes SHOCK-of the nervous system in sepsis in children, depending on age.

In both groups, the incidence of prevalent syndrome of motor disorders (1–6 months of 14 (46%) and 6.12 at 32 months (64%)). The syndrome of emotional and behavioral disorders and liquorodynamic violations in the first group met with the same frequency (in 8 (27%)), and in group 2-behavioral emotional distress syndrome occurred in 12 (24%) of patients with sepsis. With age liquorodynamic violations syndrome decreased, and occurs in 2 (4%) patients. This can be explained by modifications of this syndrome in the motor or the other. Syndrome of vegetative-visceral dysfunction between the ages of 1 to 6 months, in our research, are not met, while at the age of 6 to 12 months mentioned in only 4 (6.9%) patients with sepsis.

In the studied age groups we have studied neyromarkery: definition-of the protein S-100 and the activity of the NSE. NSE are structural components of neural tissue cells carrying specific CNS function (enzyme, receptor, regulatory, transportation, modulator, etc.), And enter the systemic circulation in violation of the blood-brain barrier permeability. NSE refers to the intracellular enzymes of the CNS, it gives an opportunity to use it to identify and assess the severity of neurological disorders occurring during sepsis in infants. NSE content in blood serum in patients between the ages of 1–6 months with neurological syndromes and LDN NAM approaching the healthy norm ( $r_{1-2,1-4} > 0.05$ ), and the syndrome of ESP values NSE significantly decreased to  $2.9 \pm 0.01$  nm/h ( $r_{1-3} < 0.001$ ). At the age of 6–12 months NSE content in all encountered neurological syndromes was significantly higher ( $r_{5-6} < 0.05$ ;  $r_{5-7,5-8} < 0.001$ ). Results NSE content studies at different syndromes depending on age showed that the syndrome ESN age significantly increased the rate ( $r_{3-7} < 0.01$ ), and the syndrome LDN NSE reduced ( $r_{4-8} < 0.001$ ). The syndrome Nam NSE values do not change with age ( $r_{2-6} > 0.05$ ).

The protein content of S-100 in patients with sepsis, children with previous USC compared to the healthy group was significantly increased in all age groups ( $r_{1-2,1-3,1-4} < 0.001$ ;  $r_{5-6,5-7,5-8} < 0.001$ ). When ESP syndromes and LDN value S-100 do not change in catamnesis ( $r_{3-7,4-8} > 0.05$ ), whereas in Nam syndrome with age this figure was significantly reduced ( $r_{2-6} < 0.001$ ) (Table 1).

Table 1. – Contents enalazy neuron (NSE) and S-100 proteinin the serum of children with sepsis preceded NCSP

Indicators	Age from 1–6 months				Age 6–12 months			
	Healthy	DN	EPN	LDN	Healthy	DN	EPN	LDN
NSE (Ug/L) n=80	9,2 $\pm$ 1,8	6,67 $\pm$ 1,8	2,9 $\pm$ 0,01*	8,88 $\pm$ 1,2	1,3 $\pm$ 0,4	6,23 $\pm$ 1,8*	8,5 $\pm$ 1,8*	2,9 $\pm$ 0,05*
S-100 (Ng/l) n=80	76 $\pm$ 3,2	19,1 $\pm$ 33,4*	245,25 $\pm$ 44,3*	391,5 $\pm$ 0,52*	22,3 $\pm$ 4,0	234,8 $\pm$ 17,1*	309,4 $\pm$ 34,8*	380,9 $\pm$ 29,9*

Note: \* – the accuracy with healthy; \*\* – Significance between the study-their basis syndromes (DN- syndrome of motor disorders, EPN- syndrome emotio-tional-behavioral disorders, LDN- syndrome liquorodynamic violations) in the age groups of 1–6 months and 6–12 months

Content in serum S-100 and NSE protein in children with sepsis without prior NCSP is shown in Table 2. The studies have shown that NSE content in patients between the ages of 1–6 months were not significantly different from those of the healthy age group ( $r_{1-3} > 0.05$ ), and in children aged 6–12 months, this figure was significantly lower in the group of healthy twice ( $P_{2-4} < 0.001$ ). NSE Indices according to age significantly decreased ( $8,22 \pm 1,2$  and  $2,71 \pm 0,6$ ; respectively  $r_{1-2} < 0.001$ ). Co-content of the S-100 protein in the serum of children with sepsis without

prior NCSP were significantly higher in both age groups (patients 1–6 months — 3.4 times and in patients from 12.6 months — 15.8 times) compared with healthy children ( $r_{1-2,2-4} < 0.001$ ). In healthy children with the age of the value S-100 significantly decreased ( $r_{3-4} < 0.001$ ), and patients with these values remained high ( $r_{1-2} > 0.05$ ). This is apparently due to the presence of prolonged septic process 2 in the child table.

This is apparently due to the presence of prolonged septic process 2 in the child table.

Table 2. – Contents enalazy neuron (NSE) and S-100 protein in the serum of children with sepsis without prior NCSP

Indicators	Age from 1–6 months	Age 6–12 months	Healthy 1–6 months	Healthy 6–12 months
NSE (Ug/L) n=80	8,22±1,2	2,71±0,6**	9,2±1,8**	1,3±0,4
S-100 (Ng/l)n=80	264,36±45,6*	352,81±48,2*	76,1±3,2**	22,3±4,0

Note: \* – the accuracy with healthy; \*\* – Reliability depending on the age of 1–2 and 3–4

Thus, in patients with sepsis in young children 82.4% were found to have previous USC, but only in 17.6% of patients with sepsis had no prior USC. The high frequency of the presence of sepsis preceding NCSP met in age from 6 to 12 months and amounted to 62.5% of cases, whereas in patients aged 1 to 6 months, it was 37.5%.

**Conclusion.** NRC Research in peripheral blood allow us to estimate the number of affected cells in the CNS, the severity of

lesions and the prognosis of the disease. Follow-up studies the NRC in the peripheral blood showed no normalization parameters in patients with sepsis children not only with the presence of the previous USC, but also in children without USC. This is the basis for the development of the respective pathogenetic therapy with this pathology.

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## Genetic determinancy with polymorphism of gene ACE of the risk for development of chronic kidney disease in children and adolescents with type 1 diabetes mellitus of Uzbek population

**Abstract:** The purpose of research was to study distribution of the alleles frequencies and genotypes of I/D gene-candidate of the kidney pathology AKF in children and adolescents with type I diabetes mellitus in Uzbek population with presence and absence of CKD (chronic kidney diseases), and to assess informative capacity of its study as marker for prognosis of kidney



lesion in diabetes mellitus type 1. There were studied 120 children and adolescents with type 1 diabetes mellitus, of them males were 53 (44,2%) and females — 67 (55,8%). The mean age of patients was  $13,8 \pm 2,7$  years (Me 15,0; IQR 13,0–16,0). The stages of chronic kidney diseases were classified according to recommendations K/DOQI (2012). There was found that in children and adolescents with DM type 1 in Uzbek population the use of new classification K/DOQI (2012) allowed evaluation of the attenuation of the kidney function at earlier stages: in 61,9% of children and adolescents with DM type 1 even still at stage NAU there was noted SKD  $80,6 \pm 7,5$  ml/min/ $1,73 \text{ m}^2$ , that corresponds stage II of CKD and 16,7% have CKD  $45 \pm 9,5$  ml/min/ $1,73 \text{ m}^2$ , that corresponds to stage III CKD. As well as in 28,6% of children and adolescents at the stage MAU there is noted CKD II, in 75,0% of CKD III stage, respectively. With regard to frequency the distribution of genotypes of ACE gene in children and adolescents with type I diabetes mellitus was characterized by reliable correlation of the DD genotype connected to stage of severity of CKD, reduction of ECV, that confirms effect of genetic factors in the development of CKD. I/D polymorphism of ACE gene is the molecular-genetic marker of the predisposition to the development of CKD in type I DM in children and adolescents of Uzbek population.

**Keywords:** diabetes mellitus, children and adolescents, CKD, polymorphism of ACE gene.

### Introduction

The chronic kidney disease is a pathology, according to rates of growth of prevalence gaining character of noninfectious epidemic alongside with such diseases as diabetes mellitus (DM) and obesity. Chronic kidney disease develops in 13–15% of the persons in a general population and much more often — till 40–50 of% — in groups of risk, to which the patients with DM are attributed [1; 6]. According to the prognosis of International Diabetic Federation the number off patients with DM will increase to 552 mln in the world to 2030. The severity of DM is caused by generalized damage of the vascular system with development of multiple microvascular (nephropathy, retinopathy) and macrovascular complications (ischemic heart disease (IHD, peripheral atherosclerosis). The frequency the temps of development of vascular complications, besides the modified factors (hyperglycemia, arterial hypertension (AH), dislipidemia), depends on individual genetic features describing the large or smaller sensitivity of an individuum to damaging effect of the pathological factors at DM [5].

Diabetic nephropathy (DN) is one of the most dangerous complications of DM leading to progressive attenuation of kidney filtration function, which result is development of chronic renal insufficiency (uremia). The classical sign of DN is increased excretion of protein with urine — microalbuminuria (MAU) and in the further — proteinuria (PU). The special feature of study of renal complications in the patients with type I DM is based on definition of protein excretion [2]. Now with the purpose of diagnosis of renal pathology the term CKD was introduced, which represents the generalizing supranosological conception and allows to estimate presence and severity degree of kidney impairment independently on the cause of damage Chronic kidney disease is understood as presence of one or more laboratory, structural or functional attributes of kidneys damage of duration > 3 months or isolated decrease of velocity of glomerular filtration (GFV) < 60 ml/min/ $1,73 \text{ m}^2$ . In our research we were guided by the classification of CKD, accepted in the world, and defined its presence as stable (more than 3 months) decrease of GFV < 60 ml/min/ $1,73 \text{ m}^2$  [3; 7].

The leading reason of the development of all vascular complications of DM, including CKD, seems to be chronic hyperglycemia. However at a part of the patients the damage of kidneys develops and quickly progresses, despite of satisfactory glycemic control, that shows the influence of nonglycemic mechanisms. There is shown interrelation of a level of proteinuria, degrees of AH and expression of glomerular sclerosis [4]. In 1989 the first works about possibility of family inheritance of diabetic kidney pathology appeared [5]. The allocation of this category of the pa-

tients has allowed to assume significant participation of the genetic factors in development DN and CKD.

CKD is second, after the cardiovascular pathology, reason of mortality of the patients with DM. The control of a level of glycemia and AP with use of preparations, blocking rennin-angiotensin system (RAS) may attenuate progressing, but not prevent development of pathology. The study of genetic predisposition to CKD presents the special importance from positions of prognosis and formation of groups of risk at preclinical stage, when the pathological changes are potentially convertible [1; 8; 9].

Modern strategy of research of genetic predisposition to such multifactorial pathology, as vascular complications of DM, is based on study of polymorphic markers of the genes — candidates — genes, the products of expression of which participate in the pathogenesis of this disease [10; 11; 12]. The polymorphic marker (PM) of gene is variable site of DNA, connected with certain phenotyping attribute (for example, AH). The association of a genetic marker with disease includes reliable differences in distribution of frequencies of alleles or pair set of alleles (genotype) in persons with presence and absence of pathology.

**The purpose** of our work was to study distribution of frequencies of alleles and genotypes of I/D gene-candidates of the renal pathology ACE in children and adolescents with DM type 1 of Uzbek population with presence and absence of CKD, and to evaluate informativity of its investigation as marker of prognosis of kidney damage in DM type 1.

### Materials and methods

This study were enrolled 120 children and adolescents with type I DM of the Uzbek population included by the principle “case-control”. The selected patients were ethnically homogenous. Group I (n=32) was formed through not overlapped criteria of selection: the patients with CKD at duration of disease less than 5 years (“CKD+”, n=12) and patients without CKD with DM type 1 with duration of disease more than 10 years (“CKD-”, n=20). In this group there was studied ID polymorphism of ACE gene. In 2 group (n=120) the patients were divided into subgroups “CKD+” and “CKD-” (n=51 and n=69) without dependence on duration of DM, where polymorphism of gene ACE was also investigated. Such approach to creation of groups with use of “polar” phenotypes was applied because CKD especially at DM is a multifactor disease in order to reduce masking influence of not genetic risk factors, from which the duration of influence of hyperglycemia appeared to be one of the most significant. Presence of CKD was defined as persistent decrease in CKD < 60 ml/min/ $1,73 \text{ m}^2$ , designed on the standard formula of Shwartz.

Table 1. – General characteristic of groups with presence and absence of CKD

Clinical parameters	Group 1, n=32			Group 2, general, n=120		
	CKD+ less than 5 years, n=12	CKD- more, than 10 years, n=20	P	CKD+, n=51	CKD-, n=69	P
Sex (m/f),%	50/50	55/45		37,3/62,7	49,3/50,7	
Age, years	13,5±2,5	14,5±1,2	0,14	14,6±1,7	13,2±3,1	<b>0,004</b>
Duration of DM, years	2,1±1,5	11,1±1,3	-	7,4±3,7	6,1±3,9	0,07
HbA1 <sub>c</sub> ,%	11,1±2,7	10,6±2,4	0,59	9,8±2,1	10,1±2,5	0,49
Cholesterol, mmol/l	4,6±0,7	4,1±0,8	0,08	4,6±1,1	4,2±0,8	<b>0,03</b>
SAP, mm Hg.	107,1±10,5	106,8±9,2	0,93	110,3±13,1	105,5±10,0	<b>0,03</b>
DAP, mm, Hg.	70,4±8,1	70,5±9,7	0,98	72,5±9,6	68,3±8,5	<b>0,01</b>
BMI, kg/m <sup>2</sup>	16,4±2,2	18,9±2,2	<b>0,004</b>	18,7±3,1	18,0±2,9	0,21
CFV, ml/min/1,73 m <sup>2</sup>	46,2±26,8	172,6±44,6	<b>0,0001</b>	49,3±26,1	168,9±58,4	<b>0,0001</b>
Retinopathy, %	33,3 (n=4)	75,0 (n=15)		56,9 (n=29)	37,7 (n=26)	
MAU, mg/l	137,5±144,5	25,3±16,9	<b>0,002</b>	155,6±180,7	21,0±13,2	<b>0,0001</b>

Isolation of genom DNA and genotyping by I/D polymorphic marker of ACE gene (was performed in the Laboratory of Human Functional Genomic of the Institute of Genetics and experimental biology of plants. The Academy of sciences of the Republic of Uzbekistan). Isolation of DNA was carried out by a method of Higuchi H. Erlich (1989) with use of a dry set of reagents Diatom™ DNA Prep 200.

Statistical processing of the received results was performed with use of program STATISTICA 6 and Biostat. The ratio of chances

(CR) and 95% CI (95% CI) were calculated with use of logistic regression. Reliability of various parameters were evaluated with use of nonparametric criterion  $\chi^2$  (Pirson's criterion). The quantitative parameters are presented as M±SD, and median (Me) and 25 and 75 percents (IQR). Differences between groups were considered as statistically significant in p=0,05.

The conditions of PCR and sequence of primers for amplification of the studied locuses are given in table 2.

Table 2. – Sequences of primers and special features of amplifications of polymorphic sites of ACE gene

Polymorphic marker	Direct and inverse primers (5'-3')	MgCl <sub>2</sub> , mM	Annealing, ° C
ACE (I/D)	CTGGAGACCACTCCCATCCTTCT GATGTGGCCATCA-CATTCGTCAGAT	1,5	62

### Results

The clinical characteristic of the patients is presented in table 1. All patients were comparable on age, gender, BMI. In groups "CKD+" in comparison with the patients without "CKD-" there was noted reliable difference in BMI, CKD and level of albuminuria. In the patients with CKD the more high level of albuminuria and SAP was registered (main nonglycemic risk factors of CKD progressing).

The distribution of frequencies of genotypes in sample "CKD-" on all polymorphisms met to balance of Hardy-Wainberg. Markers of ACE gene showed reliable association with development CKD.

Marker I/D of ACE gene (angiotensin converting enzyme): in group with CKD (+) in process of inclusion and accumulation of allele D in a genotype the frequency of occurrence of this genotype in

relation to genotype II reliably increased (OR=9,0; CI 95% 1,42–57,1). In group with CKD (-) there was not observed any case of carrying of DD genotype of ACE gene and also frequency of occurrence of I/D genotype was reliably less than genotype II (OR=32,1; CI 95%; 5,66–182,2). In children and teenagers with type I DM of the Uzbek population without CKD the frequency of occurrence of a genotype II was reliably higher in comparison with group "CKD+" in which duration of disease was less than 5 years: 85,0% vs 8,3%, p=0,0001. It was established, that carrying of genotype DD of ACE gene has predisposing importance, as at DM of duration more than 10 years without CKD there was no one case with a genotype DD, whereas, at presence of CKD the frequency of occurrence of genotype DD has made 75%. The data are shown in table 3.

Table 3. – Distribution of markers and genotypes of gene ACE in children and adolescents with type 1 DM with presence or absence of CKD in relation to duration of disease

Genotypes	CKD+ less than 5 years, n=12		CKD- more than 10 years, n=20		OR	95% CI	p
	n	%	n	%			
II	1	8,3	17	85,0	62,3	5,73–678,2	0,0001
I/D	2	16,7	3	15,0	0,88	0,13–6,22	0,71
DD	9	75,0	–	–			
OR; 95% CI; p	9,0; 1,42–57,1; 0,04		32,1; 5,66–182,2; 0,0001				
	Reliably more than DD		Reliably more than II				

At the analysis of data of the distribution of polymorphism of ACE gene in children and adolescents with type I DM of Uzbek population depending on presence and absence of CKD without the taking into account of duration of disease has come to light, that in group with presence of CKD the frequency of occurrence of genotype DD reliably increased in relation to genotype II (OR=9,0;

CI 95% 9,94–84,0). In group with CKD (-) there was not observed any case of carrying of genotype DD of gene ACE, as well as the frequency of occurrence of genotype I/D was reliably less than genotype II (OR=4,0; CI 95% 1,97–8,12). In group without CKD the frequency of occurrence of genotype II was reliably higher in comparison with group of CKD (OR=32,0; CI 95% 8,99–113,4) and

85,0% vs 8,3%,  $p=0,0001$ . It is established, that carrying of genotype DD of gene ACE has predisposing meaning, as in group without CKD even not depending on duration of disease not a sole case

was observed with a genotype DD, whereas, at presence of CKD the frequency of occurrence of genotype DD accounted for 84,3%. The data are submitted in table 4.

Table 4. – Distribution of markers and genotypes of gene ACE in children and adolescents with type 1 DM with presence or absence of CKD without taking into consideration of disease duration

Genotypes	CKD+, n=51		CKD-, n=69		OR	95% CI	p
II	3	5,9	46	66,7	32,0	8,99–113,4	0,0001
I/D	5	9,8	23	33,3	4,60	1,61–13,1	0,005
DD	43	84,3	–	–			
OR; 95% CI; p	28,9; 9,94–84,0; 0,0001		4,0; 1,97–8,12; 0,0001				
	Reliably more than DD		Reliably more than II				

### Discussion

The works devoted to study of genetic markers of a pathology of kidneys in the patients with DM, are scarce and very inconsistent. It is connected not so much to heterogeneity of ethnic groups or interpopulational differences of the results of investigations. First of all, definition of kidney lesions in the patients with DM induces significant complications. Under conditions of multifactor lesion of organ-targets in DM, significant frequency of accompanying cardiovascular pathology, AH, urinary tract infection, wide use of drugs blocking rennin-angiotensin system (RAS), that significantly influence on the evaluation of protein excretion, identification of classic DN is very difficult. In this connection the use of classification of CKD as the main criterion for formation of groups of comparison is considered for us to be the most optimal choice.

What is the basis for effect of gene polymorphism on the development of that or other pathology and, consequently, on the possibility to study and evaluation of risks? Polymorphic marker of gene represents the variable site of DNA, which carrying of certain variant induces change of product of gene expression (enzyme activity or protein-transporter) that, in its turn, directly or most of all, indirectly, change one phenotype sign. However the presence of allele or genotype of risk does non result in development of disease, only at specific combinations of alleles and genotypes genetic predisposition may be realized into phenotype of pathology under effect of pathological ambient factors. As a rule, research included polymorphic markers of those genes, which code modulators of investigated pathology known underlying the pathogenesis of disease.

In our research the reliable association with development of CKD was shown by the markers of a gene coding key media-

tors of kidney damage: vasoactive factors of endothelium (ACE). Polymorphism of ACE gene type of insert/absence of insert (I/D, insertion/deletion). This polymorphism connected with level of angiotensin converting enzyme and, consequently, regulates production of angiotensin II –key factors for development and progressing of glomerulosclerosis. To the present time there have been accumulated multiple data about presence of association of I/D polymorphism of ACE with vascular complications of DM: DN, IHD and myocardial infarction. Meta-analysis, including investigations for 10-year period and 14727 patients with DM showed that genotype DD of gene ACE seems to be independent risk factor for development of DN in type 1 DM and type 2 DM [9]. In our work there was revealed statistically significant differences between groups of CKD in type 1 DM in children and adolescents of Uzbek population.

### Conclusions:

1. As a result of research it is established, that the development of CKD in children and adolescents with type 1 DM of Uzbek population is genetically determined.

2. It is established, that carrying of genotype DD of gene ACE has predisposing meaning, as at DM by duration more than 10 years without CKD no sole case was with a genotype DD, whereas, at presence of CKD the frequency of occurrence of a genotype DD has made 75%.

3. The reliable association of the risk of CKD with polymorphism of ACE gene has been revealed, that, in its turn, allows to use data of polymorphic markers as genetic diagnosticum in order to prognose CKD and to form risk groups for development of pathology at the pre-clinical stage.

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## **The degree of production cytokines il-8 and il-12 in patients with extrinsic allergic alveolitis**

**Abstract:** The objective of the research was to examine the level of concentration of certain cytokines, involved in the regulation of immune response in patients with extrinsic allergic alveolitis (EAA), in particular production IL-8 and IL-12. To clarify the immunological bases of the pathogenesis EAA we studied the concentration of certain cytokines involved in the regulation of immune response in patients EAA in particular IL-8 production and IL-12. Analysis of the content of IL-8 in the surveyed patients EAA showed that the level of it's in the general group of patients studied was  $38.4 \pm 2.5$  pg/ml and greatly exceeds the values characteristic for healthy persons ( $18.1 \pm 1.8$  pg/ml,  $p < 0.01$ ). Thus, the highest level studied parameter seen in the patients of chronic stage EAA that distinguishes this group among the total group studied patients with EAA, and distinguishes it from the two comparison groups with acute and subacute stage of the disease.

**Keywords:** Extrinsic allergic alveolitis, cytokines, immune response.

**Introduction.** Extrinsic allergic alveolitis (EAA) — a group of diseases characterized by allergic diffuse lesions of alveolar and interstitial lung structures and emerging in response to the repeated inhalation dust of antigens organic and inorganic origin and use of drugs. According to the WHO group of diseases under this name is

detected in 3% of patients with pulmonary and reaches 42 cases per 100,000 populations [2, 4]. EAA is rightly considered immune disease, the development of which the leading role belongs to allergic reactions of the 3rd and 4th types [1]. Nowadays, one of the most important areas of immunology has been the development of

the concept of cytokine network — a system of humoral mediators between immunocompetent and other cells involved in immune reactions, which carry out consecutive change of phases of immunological response, cooperation between the factors of nonspecific protection and immunity, reaction early and late phase inflammation, switching classes synthesis antibody [3, 5]. Among the most known cytokines important place is dedicated to cytokines Interleukin-8 and -12 affecting various kinds of active movement of leukocytes and other cells, as well as regulating cell-mediated immunity in various inflammatory processes.

**The objective of the research** examine the level of concentration of certain cytokines, involved in the regulation of immune response in patients with extrinsic allergic alveolitis (EAA), in particular production IL-8 and IL-12.

**Material and methods of the research.** To achieve the objective were examined 60 patients EAA with different course of disease who were hospitalized in the pulmonology department of the Sa-

markand city hospital. Verification of the diagnosis carried out in accordance with the International Classification WHO (ICD-10, J67). All patients EAA according to the stage were divided in 3 groups: Group 1 — acute, Group 2 — subacute, group 3 — the chronic stage of the disease. All clinical and biochemical laboratory tests conducted standardized methods. Determining the level of IL-8 and IL-12 in serum was performed by ELISA. The obtained data were subjected to statistical processing according to the standard methods of statistics using BIOSTAT programs.

**Results of investigations.** To clarify the immunological bases of the pathogenesis EAA we studied the concentration of certain cytokines involved in the regulation of immune response in patients EAA in particular IL-8 production and IL-12. Analysis of the content of IL-8 in the surveyed patients EAA showed that the level of it's in the general group of patients studied was  $38.4 \pm 2.5$  pg/ml (Figure 1) and greatly exceeds the values characteristic for healthy persons ( $18.1 \pm 1.8$  pg/ml,  $p < 0.01$ ).

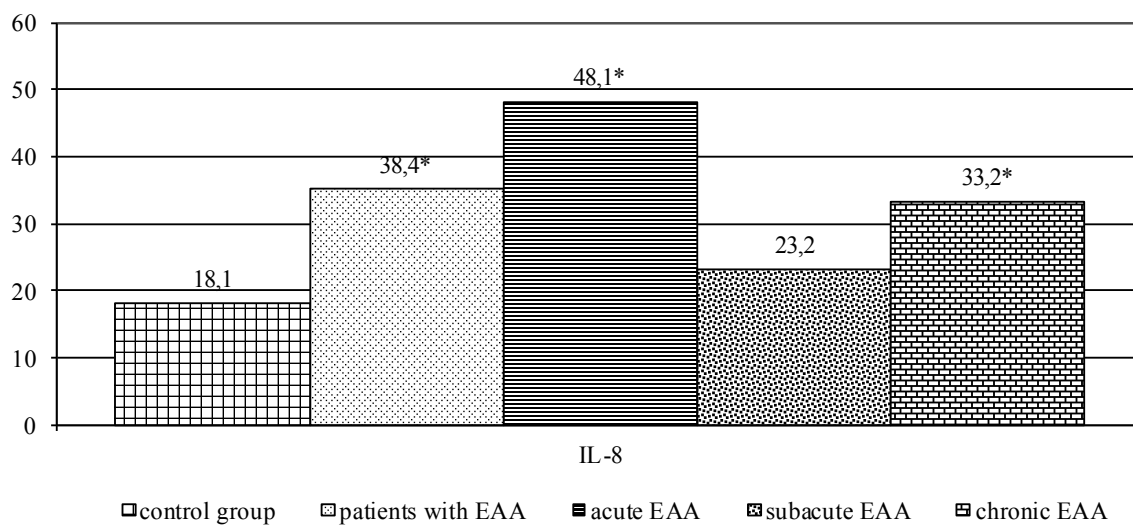


Figure 1. The level of IL-8 (pg/ml) in patients depending on the phase currents EAA

Note: \* -  $p < 0.05$  – significant differences in comparison with indicators of the group of healthy persons

When comparing of the studied parameters in groups of patients with different clinical course revealed that the highest levels of IL-8 is registered among patients with acute course EAA. In this group, the content of IL-8 was  $48.1 \pm 4.31$  pg/ml, more than 3 times higher than the control group. Conversely, the level of IL-8 was relatively low with chronic EAA, intermediate values was in patients with subacute EAA. Therefore, the results obtained indicate that

that all investigated clinical variants EAA characterized by an increase of serum of patients with IL-8, but at the same time, domination of humoral allergic mechanisms in the pathogenesis of the acute EAA ( $48.1 \pm 4.31$  versus  $18.1 \pm 1.81$  pg/ml,  $p < 0.05$ ).

In studying of serum IL-12 in surveyed our population patients identified the following characteristics of this indicator, depending on the phase of the EAA (Table. 1).

Table 1. – Levels of IL-12 depending on the stage EAA

Nº	Group of surveyed	IL-12 (pg/ml)
1	Practically healthy (n=15)	$64,8 \pm 8,7$
2	General group (n= 45)	$97,9 \pm 4,31^*$
3	Acute Form EAA (n=17)	$111,6 \pm 10,2^*$
4	Subacute Form EAA (n=11)	$141,6 \pm 10,2^*$
5	Chronic Form EAA (n=17)	$159,9 \pm 12,0^*$

Note: \* -  $p < 0.05$  – significant differences in comparison with indicators of the group of healthy persons

So, when analyzing of the results obtained established, that patients with EAA level IL-12 amounts to  $97,9 \pm 4,31$  pg/ml, significantly higher than the indicators of the group of healthy persons ( $64,8 \pm 8,7$  pg/ml,  $p < 0.01$ ). As it turned out, level IL-12 varies considerably our groups of patients with different stages of the EAA. The highest this parameter recorded in patients in the chronic stage of EAA ( $159,9 \pm 12,0$  pg/mL)

significantly differs from that of the healthy group ( $64,8 \pm 8,7$  pg/ml,  $p < 0.01$ ), and patients with acute EAA ( $111,6 \pm 10,2$  pg/ml,  $p < 0.01$ ). Also in patients with subacute EAA level of IL-12 is more than two times higher than in control group ( $p < 0.02$ ).

Thus, the highest level studied parameter seen in the patients of chronic stage EAA that distinguishes this group among the total

group studied patients with EAA, and distinguishes it from the two comparison groups with acute and subacute stage of the disease.

Taking into account described in the literature familial cases of the susceptibility to the disease, we studied the immunological

changes in 19 patients with a family history on EAA. As can be seen from Table 2 when analyzing immunological parameters in patients of the study group there is an increase of IL-8 to  $35,2 \pm 4,12$  pg/ml by comparison with the group of healthy ( $18,1 \pm 1,81$  pg/ml,  $p < 0.02$ ).

Table 2. – The cytokine status in patients with a family burdened EAA

Nº	Groups of surveyed	IL-12 (pg/ml)	IL-8 (pg/ml)
1	Practically healthy (n=15)	$64,8 \pm 8,7$	$18,1 \pm 1,81$
2	General group (n=45)	$97,9 \pm 4,31^*$	$38,4 \pm 2,5^*$
3	Patients with a family burdened EAA (n=19)	$60,9 \pm 6,8$	$35,2 \pm 4,12^*$
4	Patients without a family EAA burdeness (n=26)	$62,2 \pm 5,8$	$28,1 \pm 4,9^*$

Note: \* –  $p < 0.05$  – significant differences in comparison with indicators of the group of healthy persons

Levels of IL-8 in patients EAA with family history constituting  $35.2 \pm 4.12$  pg/ml exceeded ( $28,1 \pm 4,9$  pg/ml) and IL-12 level was  $60.9 \pm 6.8$  pg/ml had lower values compared with those without family history ( $62,2 \pm 5,8$  pg/ml). When comparing patients with EAA and the general group of patients without family history level of the studied parameters did not reach statistical significance.

**Conclusion.** Therefore, the results of the study the levels of

production IL-8 and IL-12 have shown that EAA during acute course accompanied most pronounced changes in the proinflammatory cytokine IL-8 that provides an active migration of various types of immune cells to the inflammatory focus, and the period of subacute and chronic allergic inflammation accompanied by marked changes in cytokine production by regulating the cellular immune response in particular IL-12 in patients with EAA.

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## Gender differences in the distribution of HLA II markers in chronic glomerulonephritis and chronic kidney disease in Uzbek population

**Abstract:** Chronic kidney disease (CKD) leads in the majority of instances to end stage renal disease (ESRD) requiring renal replacement therapy. Our interest was to find the possible associations of HLA class II alleles with ESRD according to the gender specificity in Uzbek population.

**Keywords:** Chronic kidney disease, End Stage Renal Disease, HLA.

Chronic kidney disease (CKD) represents an increasing global worldwide health problem particularly in elderly people [1; 2] and/or affected by diabetes, hypertension, and obesity [3]. Therefore, understanding the biological machinery associated with CKD represents an important objective in nephrology and internal medicine. According to global WHO data at the moment kidneys diseases are diagnosed for 300–600 million people — about 5–10% of the population of the planet [http://who.int/mediacentre]. According to the Health Institute statistic data in Uzbekistan was observed an increase of patients with End Stage Renal Disease (ESRD) in 2014. The number of reported cases of ESRD in the country was 18000 in 2014, and at the moment there are 1888 patients requiring hemodialysis program.

It is well known that glomerulonephritis progresses to CKD and can develop in ESRD despite receiving specific therapy; the progression level varies and depends on the Host factor. Investigation of the specific genetic-markers in ESRD patients can help to find new strategies of prognosis and prevent ESRD at the early stage. As known, many genome-wide association studies have detected a strong association between the human leukocyte antigen (HLA) and glomerulonephritis over the world populations [4–7], and most of them show the association between HLA and ESRD. The genetic factors play a role not only in the identification of genetic markers of the disease, but also in the emergence of new concepts of the mechanisms of the disease and in addition of information about protective and predisposing factors in the development of diseases, as well as the formation of hypotheses about the totality of exogenous and endogenous factors that lead to disease.

As it is known, for multifactorial diseases has geographic and population conditionality associated with the peculiarities of linkage disequilibrium on different continents, as well for some diseases characterized by a specific distribution by gender, so for example, primary glomerulonephritis occurs twice often in men than in women. Based on the aforesaid, in this study we tried to investigate the association between HLA class II polymorphism and CG, for finding out the mechanisms underlying the initiation and progression of this pathology in Uzbek population according to gender distribution.

**The aim** of this study is to examine gender differences in the distribution of HLAII gene in patients with chronic glomerulonephritis and chronic kidney disease in the Uzbek population.

## Materials and methods

The study was performed at the Institute of Immunology of the Academy of Sciences of Uzbekistan in the lab of human genomics named after Professor R. M. Ruzybakiev and SDC “Immunogen Test” in the period from 2010 to 2016y. y. The selection of patients in outpatient and inpatient treatment was carried out on the basis of RSCS named acad. V. V. Vahidov and SDC “Immunogen Test” at the Institute of Immunology of the AS of Uzbekistan. We have examined 542 people of Uzbek nationality. During the process of selecting individuals for this study we took into account their national identity in three generations, according to the recommendations VII Workshop on HLA (1977). The 225 people of these have been diagnosed with chronic glomerulonephritis, chronic renal failure complicated with end-stage, to whom the chronodialize was recommended. The control group consisted of 317 healthy individuals who are relatives of the first line of kinship. The patients were 51 female and 174 male, mean age was 34,35±11,41. Among the donors were 163 male and 154 female, mean age was 40,84±11,12.

The DNA Isolation was carried out using the method of alcohol-salt treatment by S. Miller et al (1988). HLA-typing of alleles of genes DRB1, DQA1 and DQB1 was performed using kits “of HLA-DNA-TECH” (« DNA Technology SPA», Moscow) using PCR mSSP method (polymerase chain reaction with sequence-specific primers) in modification of Institute of Immunology MOH RF (D.Yu. Trofimov, 1996) and with Q-PCR. As a result of the behavior of the reactions were determined following DRB1 specificity: DRB1 \* 01, \* 04, \* 05, \* 07, \* 08, \* 09, \* 10, \* 11, \* 12, \* 13, \* 14, \* 15, \* 16, \* 17 (Splits option \* 03) \* 18 (\* Splits version 03). During the process of typing of the DQA1 locus the following specificities were found: \* 0101, \* 0102, \* 0103, \* 0201, \* 0301, \* 0401, \* 0501, \* 0601. On locus DQB1: \* 0201, \* 0301, \* 0302, \* 0303, \* 0304, \* 0305, \* 0401/02 \* 0501 \* 0502/04 \* 0503, \* 0601, \* 0602–08.

For evaluating of the results obtained, we held the statistical processing of the data, with the help of Arlequin 3.5.2.2 software package, Excel 2007, SISA and a number of formulas to calculate the OR (Odds Ratio) is the index of relative risk, EF (Etiologic fraction) — etiologic fraction, PF (Preventive fraction) — preventive fraction,  $\chi^2$ -confidence index Pearson, 95% CI-confidence interval.

Table 1. – The significant alleles of HLA II in men with CRF

HLA	Frequencies		OR	EF	PF	$\chi^2$	Pc
	CG Male, n=174	Control Male, n =153					
<b>DRB1</b>	GF	GF					
*04	0,0545	0,1732	0,29		2,151	23,079	0,00001
*08	0,0431	0,0098	4,85	0,034		6,815	0,009
*13	0,1925	0,1274	1,75	0,082		5,238	0,02
*14	0,0373	0,0065	4,18	0,028		6,966	0,008
<b>DQA1</b>							
*01:03	0,1982	0,1045	2,123	0,104		11,483	0,0007
*03:01	0,1091	0,2254	0,432		1,147	15,368	0,0001
<b>DQB1</b>							
*02:01	0,1752	0,2352	0,675		0,442	4,209	0,04
*05:03	0,0316	0,0065	0,961		0,04	5,774	0,01
*06:01	0,0775	0,0359	13,20	0,071		5,134	0,023

Note: GF – gene frequency;  $\chi^2$  – a reliability indicator according to Pearson; OR – Odds ratio; EF – etiologic fraction; PF – preventive fraction, P – a significance indicator by exact Fischer criterion, Pc – a significance indicator across Bonferroni.

**Results**

As a result of our study have been identified differences in the distribution of alleles' frequencies of genes under study not only in patients and healthy individuals, but also at the separation of the study sample by gender. As can be seen from Table 1, in this sample from the male subjects met all 5 significant markers of predisposition and 4 protecting variants.

The highest relative risks for men have been identified for specific HLA DRB1 \* 08 (OR = 4,85), both alleles (OR = 1,75) DRB1 \* 14 (6) Splits option DR6 DRB1 \* 13 (6) (OR = 4, 18), DQB1 \* 06: 01 (OR = 13,2).

In addition to markers of predisposition also met the protecting alleles, the most significance had allelic variants of HLA DRB1 \* 04 and DQA1 \* 0301.

Then the group of female patients with CG and CRF was analyzed (Table 2). There were also identified marker alleles, but they differed significantly from the relevant alleles detected in males. It is worth noting that women identified only three predisposing marker 6 and tread options. For most indicators of the relative risk for women were identified for both alleles of Splits version DR2 DRB1 \* 15 (2) (OR = 2,64) DRB1 \* 16 (2) (OR = 9,91), DQA1 \* 01: 02 (OR = 2.86).

Also we met and protecting alleles had the greatest significance of allelic variants of HLA DRB1 \* 04, HLA DRB1 \* 11 and DQA1 \* 03: 01.

Table 2. – Significant alleles of HLA II in women with chronic renal failure

HLA	Frequencies		OR	EF	PF	$\chi^2$	Pc
	CG Female n=51	Control Female, n=122					
DRB1	GF	GF					
*04	0,0588	0,1352	0,3996		1,380	4,201	0,04
*11	0,049	0,127	0,3541		1,674	4,698	0,03
*15	0,2156	0,0942	2,6423	0,134		9,373	0,002
*16	0,0392	0,004	9,9183	0,035		6,229	0,01
<b>DQA1</b>							
*01:02	0,2549	0,1065	2,8684	0,166		12,395	0,0004
*03:01	0,0686	0,1926	0,3088		1,939	8,397	0,003
*05:01	0,1862	0,2786	0,5924		0,609	3,264	0,07
<b>DQB1</b>							
*03:01	0,1568	0,2581	0,5345		0,7661	4,192	0,04
*06:02–08	0,2549	0,1434	2,0428		0,130	6,154	0,01

Note: GF – gene frequency;  $\chi^2$  – a reliability indicator according to Pearson; OR – Odds ratio; EF – etiologic fraction; PF – preventive fraction, P – a significance indicator by exact Fischer criterion, Pc – a significance indicator across Bonferroni.

Thus, as can be seen from the results obtained (Table 3), there are very interesting gender differences in the distribution of genes HLA II class in patients with CG and CRF, and if you make a com-

parative analysis with the results published earlier, where total sample involving analyzed of both genders, it becomes apparent the need to analyze with the obligatory account of gender.

Table 3. – The comparative analysis of significant markers in chronic glomerulonephritis and chronic renal failure in the total group and in the distribution by gender

	Total group, (n = 208) [Ruzibakieva M. R. et al. 2016]	Male, (n=174)	Female, (n=51)
Markers of predisposition	DRB1*08, DQA1*01:01, DQA1*01:02, DQA1*01:03, DQB1*04:01, DQB1*05:03, DQB1*06:01, DQB1*06:02–08	DRB1*08, DRB1*13, DRB1*14, DQA1*01:03, DQB1*06:01	DRB1*15, DRB1*16, DQA1*01:02, DQB1*-
Markers of resistance	DRB1*04, DQA1*03:01 DQB1*02:01, DQB1*03:02	DRB1*04 DQA1*03:01 DQB1*02:01, DQB1*05:03	DRB1*04, DRB1*11, DQA1*03:01, DQA1*05:01, DQB1*03:01, DQB1*06:02–08

The association of HLA alleles could be used as a risk classification marker and thereby progression to much more severe disease could be protected or diagnosed earlier. This would require further investigation with larger number of patients and healthy in-

dividuals. Also this investigation shows the important role of gender differentiation in prognosis of possible genetically determinate disease appearance or protection against it.

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## **Influence of groups of risk on processes of free radical oxidation in blood and urine in the workers of oil and gas refining industry**

**Abstract:** The study of the systems of free radical and microsomal oxidation, energetic metabolism appeared to be rational in the prognostic view for determination of the quantitative measure for activity of the oxidative processes in the body and identification of the group of increased risk at the occupational selection for work connected with effect of toxic substances as well as at choice of individual tactics of prevention and therapeutic correction of the oxidative processes.

**Keywords:** free radicals, oxidation, workers, oil and gas refining industry.

### **Introduction**

Early diagnostics of diseases and estimation of harmful influence of the factors of the environment are the most important problem both in clinic, and at the decision of hygienic questions [1; 2; 6; 7]. The successful decision of the given problem will allow to develop new effective methods of early diagnostics, will help to carry out directed purposeful, the scientifically proved search of optimum ways for improvement of ways for prevention and increase the body resistance [3; 4; 5; 8]. For decision of this tasks there is required development of correct prognostic criteria characterized by high sensitivity, accuracy and informativity.

With the account high informativity of parameters of the process of free radical oxidation with use of registration of chemiluminescence of blood and urine we investigated biopower and system of microsomal monooxygenases under influence chemical pollutants.

For this purpose in the erythrocytes of 47 workers at the Shurtan gas and oil-refining complex, having contact with aromatic carbohydrates, there were studied contents of ATP, ADP, AMP, activity of Na, K-, Ca, Mg-dependent ATPases, G-6-PDH (glucose-6-phosphatdehydrogenase), hexokinase (HK), Phosphofruktokinase (PFK), pyruvatkinase (PK), catalase, peroxydase, superoxidismutase (SOD), glutationperoxidase (GP), glutationreductase (GR), glutation-S-transferase (GT), glyceroaldehydphosphatdehydrogenase (GAPDH). Alongside with it there was studied concentration of Na, K, Mg, Ca and Pn, intensity of chemiluminescence of blood and urine, induced by ions  $Fe^{2+}$ , and the state of cytochrom P-450 dependent monooxygenase system.

The contents of adenyl nucleotides in the erythrocytes was measured with use of standard sets "Test combination ATP << and << Test combination FDP/AMP << of firm << Roche Diagnostics << (Switzerland). Concentration of K and Na was measured with method of flame photometry, and the quantity of Ca, Mg and P11 — with use of kits of firm "BRNO" (Cechy). The state of cytochrom-450 dependent monooxygenase system was evaluated by velocity of demetylation of administered of the drug antipirine into the body, acetylation — by velocity of asoniazide withdrawal and its acetylated derivatives.

### **Materials and methods:**

All studied participants were divided into 3 groups in view of intensity of influence chemical pollutants: group 1–11 persons not having contact with chemical pollutants; group 2–14 participants, having contact with chemical pollutants 2–3 times a week — 11 men who are not having of contact with chemical загрязнителями; 2-я — 14 men having contact with chemical загрязнителями by periodicity 2–3 times per week (group of risk); group 3–22 persons, constantly contacting with chemical pollutants in the working process during 3–5 years; group of healthy participants included 20 persons working in the administrative unit in the complex, which in the professional activity did not contact to chemical manufacture.

### **Results and discussion**

The carried out analysis of the individual data has shown, that the signs of influence chemical pollutants are found out in the first years of work in the shop on manufacture of pyromellitic

dianhydride. They testify about vegetovascular instability (subjective discomfort, lability of arterial pressure and pulse). In process of increase of the record of service from 1 year up to 5 years the percent of the persons with vegetovascular instability grows (Pirson's factor 0,65–0,75), and in the studied sample there are found persons

(28,8%) with sharply expressed sensibilized reactivity. However the greatest specific weight includes acute respiratory diseases (32,9%).

Imbalance of adenyl derivatives in the erythrocytes was found out in the persons of 2 and 3-rd groups, while in the 1-st group the condition adenyl system practically did not change.

Table 1. – Changes of antioxidant enzymes activity in the erythrocytes of workers of the Gas and Oil Refining Complex

Showing degree	First		Second		Third		Control	
	$M \pm m$	$n$ (%)	$M \pm m$	$n$ (%)	$M \pm m$	$n$ (%)	$M \pm m$	$n$ (%)
Catalase Un.	21,4±1,8	11 (100)	22,5±1,3	14 (117)	29,3±1,9	22 (147)	21,4 ± 1,6	20 (100)
Superoxidismutase Un./mg/Hb	1,01±0,04	11 (101)	1,25±0,11	14 (118)	1,49±0,11	22 (149)	1,02±0,01	20 (100)
Peroxidase Un./mg Hb/min Hb/min	28,1 ± 1,4	11 (99)	31,3±0,86	14 (110)	38,7 ± 2,7	22 (141)	29,3 ± 0,9	20 (100)
Glutathione Peroxidase Un./mgHb/min	11,3±0,38	11 (99)	12,7±0,53	14 (112)	15,8±1,09	22 (140)	11,3±0,42	20 (100)
Glutathione Reductase Un./mg Hb/min	5,91±0,42	11 (99)	6,37±0,11	14 (113)	8,24±0,37	22 (141)	5,94±0,09	20 (100)
Glutathione Transferase Un./mgHb/min	7,67±0,15	11 (100)	7,89±0,13	14 (110)	11,17±1,4	22 (139)	8,13±0,27	20 (100)
Reliability	$P > 0,5$		$P < 0,05$		$P < 0,001$			

Note: Here and in tab. 2, 3:  $p$  – reliability of distinctions in comparison with group healthy.

So, at the persons of 2 and 3-rd groups the quantity of ATP in the erythrocytes accounts for 91 and 86%, in comparison with group of healthy and concentration of ADP and AMP increased respectively 116, 127% and 199, 24%. The activity of transport ATPases, that is key enzymes of glycolysis and pentozophosphate way, quantity of ions Na, K, Ca, Mg,  $P_{11}$  and contents of SH-group (general, protein and nonprotein) significantly changed.

These fluctuations had variously directed character. If the activity of Na, K-ATPase, G-6-PDG and GAPDG in group 2 increased consequently to 115, 116 and 118%, and the contents of general and notprotein SH-group — to 115 and 116%, then activity of Ca, Mg-ATPase, HK, PPK and PK, on the contrary, reduced to 86 and 82%, and the contents of protein fraction of SF-group — to 85%. In group

3 activity of Na, K-ATPase, G-6— PDG and GAPDG increased to 144, 152 and 155%, the number of common and non protein SH-groups — to 139 and 137%, and activity of Ca, Mg-ATPase, HK, PPK and PK reduced to 74, 72 and 70%, the contents of protein fraction SH- groups — to 75%. Significant increase in activity of G-6-PDH results in generation of  $NADP \cdot H_2$  and glutathione restoration.

The changes of the levels of elements Na, K, Mg and Ca correlated to activity of transport ATPase. There were revealed also reliable changes in the enzymatic activity of antioxidant defense in the erythrocytes (table 1). Activity of catalase, peroxidase, SOD, HP, HR, and HT in group 2 increased, respectively to 115, 117, and 118% in comparison with norm, and in group 3 — to 139, 140, 141, 147 and 149.

Table 2. – Changes of the blood chemiluminescence character in the workers of Gas-Oil Refining Complex

Variable	First		Second		Third		Control		
	$M \pm m$	$n$ (%)	$M \pm m$	$n$ (%)	$M \pm m$	$n$ (%)	$M \pm m$	$n$ (%)	
Chemiluminescence	Cn	4,1±0,5	11 (127)	5,1±0,1	14 (164)	9,1±0,1	22 (288)	3,4±0,1	20 (100)
	S	27,2±1,9	11 (132)	36,1±1,8	14 (172)	71,7±5,3	22 (288)	21,7±1,3	20 (100)
	A	169±1,1	11 (115)	201±0,9	14 (136)	264±14	22 (288)	145±4,8	20 (100)
	$\pi_{min}$	3,8± 0,7	11 (95)	3,1±0,1	14 (86)	2,7±0,7	22 (288)	4,3±0,18	20 (100)
	tg $\alpha$	0,58±0,01	11 (105)	0,57±0,01	14 (119)	0,78±0,01	22 (288)	0,55±0,01	20 (100)
	reliability	$P < 0,01$		$P < 0,05$		$P < 0,001$			

Intensity of spontaneous blood luminescence, characterizing the state of free radical peroxide oxidation without outside intervention in group 2 was reliably higher than in control by 64%, and in group 3-by 188%, in group 1 prevailed the initial data by 27%. The total illuminance of luminescence, characterizing ability of lipids to underwent to oxidation, in these groups increased respectively by 1,3–3,4 times. The quick flame (A) depending on velocity of the ions  $Fe^{2+}$  and formation of active forms of oxygen in this medium, in group 2 accounted for 136% in comparison with group of healthy, in group of 3, respectively, 191%, at the same time in group 1 ampli-

tude of quick flame fluctuated by 15%. Latent period, characterizing antioxidative properties in 2d and 3d groups reduced to 86 and 71% in comparison with norm, and in group 1 it was not changed. Slower flame (tg $\alpha$ ), determining velocity of initiation of CPO, increased in group 2 and accounted for 119%, and in group 3–144%, in relation to control (table 2). At the same time chemiluminescence of urine in all studied groups was characterized by specific changes. In groups 2 and 3 it statistically was significantly differ from control and in group 1 was reliably higher than initial values by 80%, and in group 3, on the contrary, decreased to 57%.

Table 3. – Changes of the urine chemiluminescence character in the workers of Gas-Oil Refining Complex

Variables \ Groups		First		Second		Third		Control	
		$M \pm m$	$n$ (%)	$M \pm m$	$n$ (%)	$M \pm m$	$n$ (%)	$M \pm m$	$n$ (%)
Chemiluminescence	Cn	10,4 ± 0,7	11 (127)	16,3 ± 0,9	14 (164)	5,1 ± 0,3	22 (288)	9,2 ± 0,2	20 (100)
	S	56,8 ± 2,1	11 (132)	21,9 ± 2,8	14 (172)	11,8 ± 1,7	22 (288)	45,3 ± 4,7	20 (100)
	A	119 ± 3,9	11 (115)	144 ± 9,6	14 (136)	122 ± 7,8	22 (288)	189 ± 11	20 (100)
	$\pi_{\min}$	6,1 ± 0,5	11 (95)	5,4 ± 0,1	14 (86)	4,1 ± 0,3	22 (288)	6,3 ± 0,6	20 (100)
	tga	0,56 ± 0,01	11 (105)	0,45 ± 0,07	14 (119)	0,38 ± 0,06	22 (288)	0,57 ± 0,01	20 (100)
	reliability	<b>P &lt; 0,05</b>		<b>P &lt; 0,01</b>		<b>P &lt; 0,001</b>			

The total illuminance of luminescence reduced 2–4 times, and the latent period accounted for 83 and 66%, respectively. The fast and slow flash reduced in group 2 to 78 and 84%, and in group 3 — to 65 and 73% in relation to initial data (table 3).

There were not found significant changes in the findings of antipirine probe in all studied groups in comparison with norm. So, the half-life of antipirin withdrawal in group of healthy participants was determined at the level 10,55 ± 1,5 h, and antipirin clearance — 42,54 ± 2,4 ml/kg/h. In group 2 the parameters of antipirin test were 10,48 ± 2,4 h and 41,95 ± 3,3 ml/kg/h, and in the 3-rd — 11,7 ± 4,6 h and 46,24 ± 6,2 ml/kg/h, respectively. The intragroup comparison of the parameters of acetylated isoniazidasa showed absence of reliable differences distinctions between control and 1 and 2 groups and statistically significant differences in the 3d group. Control group, as studied groups, was divided to fast, moderate and slow acetylators depending on a degree of isoniazid inactivation. If in control group the basic part includes moderate (65%) and slow acetylators (33%), then in 2 and 3-rd groups the reduction of number of the persons with moderate speed of acetylation was observed. In particular, in 2 group moderate and slow acetylators accounted 48 and 42% and fast acetylators — 10%, and in 3-rd group 33, 31 and 36%, respectively. The moderate level of withdrawal of the products of isoniazid metabolism with urine differed significantly in comparison with

norm in group 3. Thus, the total sum of the excreted substances (nonmetabolised+acetylated isoniazid) in group 3 in patients with fast acetylation accounted for 38,3 ± 4,2% in norm 63,1 ± 5,8% ( $p < 0,001$ ), with moderate — 41,5 ± 3,6 in norm 52,4 ± 4,4% ( $p < 0,05$ ). These changes were observed, mainly, due to decrease in contents of acetylated isoniazid, while excretion of unchanged preparation was practically equal in all groups. This results in change of ratio of excreted with urine of acetylated isoniazid and unchanged preparation, that characterizes the state of process of acetylation. This established fact is very important, because the state of microsomal oxidation reflects tension and reserve of the biotransformational processes in the body.

#### Conclusions

Thus, the parameters of chemiluminescence of blood and urine — spontaneous luminescence and total illuminance may be pathognostic criterion for revealing influence of chemical pollutants. The process of disorders of FRO with registration of blood and urine chemiluminescence and signs of instability of the regular system of blood circulation are related to the high informative parameters of the initial stage of influence of chemical pollutants. The expressed stage of influence of chemical pollutants is characterized by stable changes in the adenyl and monooxygenase systems, enzymatic spectrum and imbalance of ions in the blood, as well as by disorders of regulation of the system of blood circulation.

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## Minimally invasive esophagectomy in esophageal cancer: treatment options

**Abstract:** Purpose. Defining the role of minimally invasive surgery in the surgical treatment of esophageal cancer.

**Materials and Methods:** Retrospective analyses of 285 simultaneous surgical interventions were carried out. Men — 129 (45.2%), women — 156 (54.8%), mean age was — 54.6 years.

**Results and discussion:** 253 (89%) patients were operated with stage II and III of disease. Surgery performed by method of McKeown — 28 (9,8%), by Lewis- 48 (16.8%), Trans hiatal Esophagectomy — 38 (13.3%) and Video-assisted Trans hiatal Esophagectomy — 171 (60%) on patients. Time spent on intervention in the operation Lewis-346,5 ± 42,8min., at McKeown-390 ± 32.5 min., at Video-assisted Transhiatal Esophagectomy 329,1 ± 28,5 min. Mortality after surgery Lewis-8 (16.6%) with Transhiatal Esophagectomy and Video-assisted Transhiatal Esophagectomy — 1 (0.6%). 5-year survival rate after surgery by McKeown-21,5%, by Lewis-16,2%, Transhiatal Esophagectomy + Video-assisted Transhiatal Esophagectomy — 10.1%.

**Keywords:** esophageal cancer, surgery, minimally invasive intervention, the survival rate.

### Introduction

Due to the increasing of life expectancy of the population of the globe especially in developed countries, the incidence of malignant tumors has the tendency to be increased. Among the most common malignant tumors, esophageal cancer ranks to eighth in the world statistics with a specific weight of 3.8% [6]. In Uzbekistan, in the structure of the Esophageal Carcinoma (EC) is on the 10th place with a specific weight of 3.6% [4]. In the structure of the world EC mortality is on the 6th place [3]. Five-year survival of patients with EC up to the date does not exceed 10–15% [1; 2].

Despite the tremendous pace of development of high technology with their application in surgical practice it is impossible to improve the long-term results of treatment of EC using only operations. Surgical treatment as the primary method of exposure can be applied only in the initial forms of EC [5; 7].

Low sensitivity of the tumor to existing chemotherapy drugs, palliative and short-term effect of radiation therapy do surgery treatment as a choice of treatment for patients with esophageal cancer [3; 5; 6].

Application of minimally invasive interventions while maintaining oncologic adequacy securely finds its place in surgical practice in Western Europe, USA and Asia. Video endoscopic surgery being alternative cavity intervention has a number of significant advantages over traditional ones. Today, there are different approaches and techniques of videoendoscopic operations on the esophagus [8; 9].

According to the classification of minimally invasive esophagectomy proposed by AUGIS (Association of Upper Gastrointestinal

Surgeons), there are several types of approaches: 1. Minimally invasive esophagectomy with anastomosis in the neck. 2. Minimally invasive esophagectomy with intrapleural anastomosis. 3. Laparoscopic assisted esophagectomy combined with standard thoracotomy overlay intrapleural anastomosis. 4. Laparoscopic assisted esophagectomy combined with minithoracotomy and overlay intrapleural anastomosis. 5. Laparoscopically assisted esophagectomy combined with standard thoracotomy with the imposition of the cervical anastomosis. 6. Thoracoscopic esophagectomy combined with a laparotomy, with imposing cervical anastomosis [6; 9].

Given the analysis of the literature aim of our study to define the role of minimally invasive surgery in the surgical treatment of esophageal cancer.

### Material and methods.

The study included 285 simultaneous experience of surgical procedures in patients with malignant thoracic esophagus disease, carried out by Research Cancer Center of the Republic of Uzbekistan of the Ministry of Health in the period from 2000 to 2011. The localization of the tumor in the thoracic esophagus (TE) was diagnosed in 10 (3.5%) patients in the middle chest region (MCR) in 104 (36.5%), in the lower thoracic (LT) in 171 (60%). The study group was men — 129 (45.2%), women — 156 (54.8%). The age group ranged from 20 to 77 years, mean age — 54.6 years. By age, the patients were distributed as follows (the WHO classification): from 18 to 44 years — 42 (14.7%), from 45 to 64 years — 191 (67,1%), from 65 to 74 years — 50 (17, 5%), aged 75 and older — 2 (0.7%). History

of the disease at the time of hospitalization was up to 3 months — 138 (48.4%), 4–6 months — 56 (19.6%) and more than 6 months — 91 (31.9%). The degree of dysphagia: I — 9 (3.2%), II — 127 (44.5%), III — 138 (48.4%) and IV — 11 (3.8%). According loss from baseline body weight: 53 (18.6%) patients weight loss is not detected, at 102 (35.8%) patients with body weight loss amounted to 1 to 10%, from 124 (43.5%) of 11 to 20% and 6 (2.1%) 21–30%.

All patients were subjected to surgical treatment of complex survey. It assesses the overall condition of the patient, the cardiovascular and respiratory system. Instrumental examination included spiral computed tomography of the chest and abdomen, x-ray of the esophagus, fibroezofagogastroduodenoscopy, endosonography of the esophagus, ultrasound of soft tissues of the neck and abdomen, fibrolaringo-traheo-bronchoscopy. Squamous cell carcinoma was verified in 269 (94.4%) patients, adenocarcinoma in 16 (5.6%). Stage of cancer of the esophagus was determined by objective data on the basis of the seventh edition of the TNM classification of malignant tumors Stage IIa (T2N0M0; T3N0M0) — 32 (11.2%), Stage IIb (T1N1M0; T2N1M0) — 179 (62.8%), III stage (T3N1M0; T4 (any)N (any)M0) — 74 (25.9%).

**Preoperative preparation was carried out in a fairly short period of time.** Correction of hypovolemia, hypoproteinemia, anemia, electrolyte disorders, blood glucose, blood rheology disorders were conducted; blood pressure and improve tropisms infarction were normalized. Much attention was paid to the preparation of the respiratory system, using therapeutic inhalation, mucolytics, bronchodilators, incentive spirometry, etc. In the cases of dysphagia and weight loss of more than 10% of the original course enteral, parenteral or mixed feeding for at least 7–10 days has been conducted. They sought to achieve a positive nitrogen balance.

Options for surgical intervention on the basis of the location and extent of tumor the functional parameters of patients were car-

ried out. In all cases esophago-gastroplasty has been performed. For example, the localization of the tumor process in Thoracic Esophagus (TE) with the spread of Middle Chest Region (MCR) and with symptoms of compression of the trachea bifurcation standard operation by McKeown performed (right thoracotomy + laprotomy + cervicotomy) applying Esophago-gastro-anastomosis on the neck on the left side. When localization of tumor in Middle Chest Region and Lower Thoracic following type of surgery were selected: Ivor-Lewis operation was performed in patients with higher functional performance and trans hiatal esophagectomy (TE) with gastroplastic and overlay esophago-gastro-anastomosis (EGA) on the neck to patients with lower functional performance were carried out.

TE is made to 209 (73.3%) patients. In our work we analyzed the shortcomings of the standard TE in 38 (18.2%) patients treated before 2004., and Republic Cancer Research Centre staff of the Ministry of Health of Uzbekistan introduced into clinical practice the hybrid technique of video-assisted trans hiatal esophagectomy (VATHE). This mediastinal stage of the mobilization of the esophagus and lymph node dissection at the Esophageal Carcinoma, especially localized at or below the bifurcation of the trachea during TE performed using video-assisting endosurgical instruments and endoscopic equipment operating — release of the esophagus, adequate lymph node dissection, careful hemo- and lymphostasis carried out under Endovisual control. When lymph node dissection was removed paraesophageal, mediastinal rear, left and right paratracheal, bifurcation, right tracheobronchial lymph node group. Coagulation and dissection of tissue produced mainly by thoracoscopic instruments. In case of difficulties for differentiation of tissues near the tumor manual palpation were used (because most of the patients were operated in the III stage of the process). The remaining steps were carried out by TE conventional technique. VATHE was performed in 171 (60%) patients (Figure № 1).

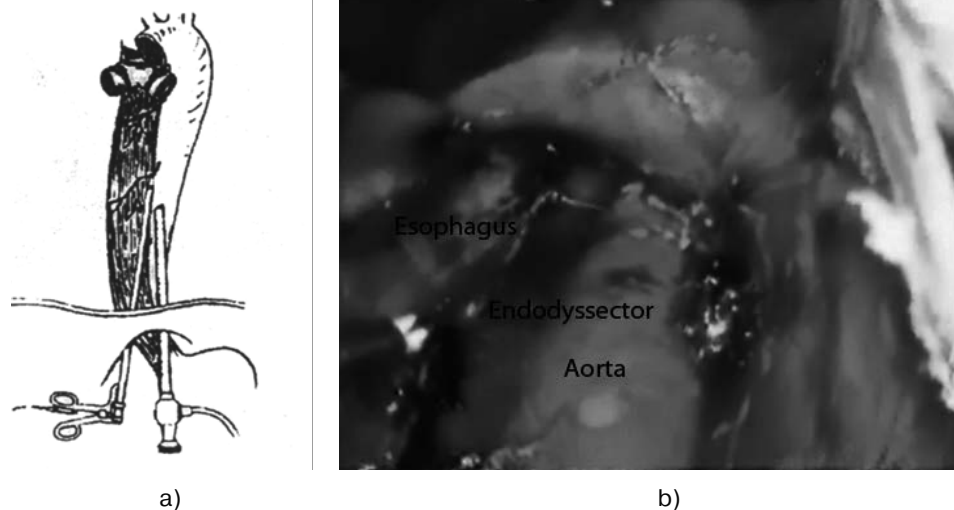


Figure 1. (a) and photo (b) video-assisted trans hiatal mobilization of the esophagus.

Operation McKeown (triple-available operation) is performed with 28 (9.8%) patients. Operation Ivor-Lewis made to 48 (16.8%) patients. The main stages of the operation did not differ from the standard conventional techniques. All patients after surgical treatment had radiation therapy and if indicated chemotherapy.

#### Results and discussion

253 (89%) patients were operated on with stage II and III disease. According to the intraoperative histological study radical operations were made to 90% of patients. In our work we were directed to results of surgical treatment according to the number and nature of intra- and postoperative complications according to the type of

surgical interventions (McKeown operation — 28 (9.8%), the operation Ivor-Lewis- 48 (16.8%), TCE — 38 (13.3%) and VATHE — 171 (60%). Intraoperative complications were observed in only 2 cases which were associated with rupture of the membranous portion of the trachea during surgery of McKeown in mobilizing Thoracic Esophagus. Both complications were successfully eliminated by the closure of the tracheal wall defect.

Evaluation of the effectiveness of different methods of surgical intervention were performed according to the amount of blood loss, time spent on performing surgery, the number of postoperative hospital days, the frequency of pulmonary complications, as

well as the frequency of early postoperative interventions according to the type of surgery.

Revealed statistically significant difference in the time spent on the intervention, and the average duration of Ivor-Lewis operation was  $346.5 \pm 42.8$  min., while the figure for the operation McKeown

was  $390 \pm 32.5$  min., and for VATHE  $329.1 \pm 28.5$  min. The average length of the esophagus with adequate lymph node dissection based on the mobilization of the type of operation are shown in Table 1. In the group VATHE the figure was 40.1 minutes.

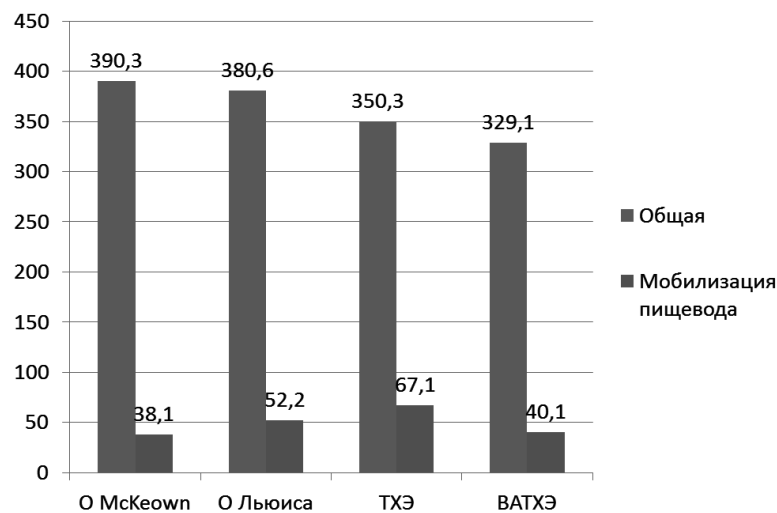


Figure 2. The duration of surgical interventions

The volume of intraoperative blood loss noted in the Group's operations: the operation by McKeown — 390,3ml, by Ivor-Lewis — 380,6 ml. Under VATHE the figure was — 407,5ml. In 258

(90.5%) were assessed as diffuse hemorrhage in 27 (9.5%) were the source of bleeding lesions of small branches of the aorta 1 (3.5%); 5 (10.4%); 4 (10.5%); and 17 (9.9%), respectively on groups.

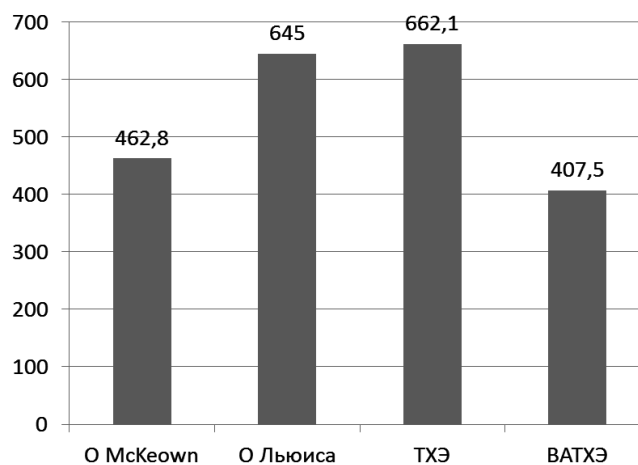


Figure 3. Indicators of intraoperative blood loss

In the early postoperative mediastinal bleeding was observed in 5 patients (1 (3.7%), and 2 (4.3%) 0 and 2 (1.2%), respectively, in groups), which was eliminated by conservative measures. Lymphorrhea of postoperative mediastinal noted in 28 (9.8%) patients (4 (14.3%) 5 (10.4%) 7 (22.6%) and 12 (7.5%), respectively), which

liquidated independently from 3 to 9 days.

In the early postoperative period in 109 (38.2%) patients showed various complications of the lungs, pleura and heart (16 (57.1%) 32 (66.7%) 11 (28.9%) and 50 (29.2%), respectively, by groups). The comparative data are summarized in Table № 1.

Table 1. – Ratio of various postoperative complications to the type of surgical intervention

№	Operation	Pneumonia	Pleuritis	Empyema	Arrhythmia	Total
1	McKeown surgery	3 (10,7%)	9 (32,1%)	1 (3,5%)	3 (10,7%)	16 (57,1%)
2	Ivor-Lewis surgery	5 (10,4%)	12 (25%)	4 (8,3%)	11 (22,9%)	32 (66,7%)
3	Transhiatal Esophagectomy	1 (2,6%)	4 (10,5%)	–	6 (15,8%)	11 (28,9%)
4	Video-assisted Transhiatal Esophagectomy	10 (5,8%)	26 (15,2%)	1 (0,6%)	13 (7,6%)	50 (29,2%)
	Total	19 (6,6%)	51 (24,9%)	6 (2,1%)	33 (11,6%)	109 (38,2%)

As seen in Table 3 pleural complications of pleurisy observed more in McKeown surgery group (32.1%) and operations Ivor-Lewis (25%), which is associated with the traditional technique of

performing a wide thoracotomy. The main cause of pleural empyema in Ivor-Lewis operation group was the failure of welds intra-pleural EGA. In the group of patients with empyema VATE found

only with 1 patient (0.6%), postoperative pneumonia in only 5.8% of patients due to the lack of a wide thoracotomy, the possibility of early mobilization of patients after surgery, earlier recovery of functions of the respiratory system.

Fixed postoperative mortality observed in 17 (5.9%) cases. Comparative indicators of deaths, its causes and due to the type of surgical intervention are shown in Table № 2.

Table 2. – The lethality incidence with respect to the type of operations, and causes of death.

№	Type of surgery	Amount of surgery	FAS	PE	AMI	Pneumonia	Brain stroke	Total
1	McKeown surgery	28 (9,8%)	–	–	–	1 (3,5%)	–	1 (5,9%)
2	Lewis surgery	48 (16,8%)	6 (12,5%)	1 (2,1%)	–	–	1 (2,1%)	8 (16,6%)
3	TE	38 (13,3%)	–	2 (5,3%)	–	1 (5,3%)	–	3 (7,8%)
4	VATE	171 (60%)	1 (0,6%)	3 (1,7%)	1 (0,6%)	–	–	5 (2,9%)
5	Total	285 (100%)	7 (2,4%)	6 (2,1%)	1 (0,3%)	2 (0,7%)	1 (0,3%)	17 (5,7%)

Thus, the highest mortality rate observed in Lewis 8 operation group (16.6%), the most frequent cause of death was a failure of anastomosis sutures FAS 6 (12.5%). In the group of TCE and VATHE EGA suture failure was the cause of death in only 1 (0.6%) — the bleeding of the main blood vessels of the neck. In all cases of pulmonary embolism occurred in those patients who were initially identified pronounced abnormalities in the cardiac

activity. The average postoperative hospital stay was 19.7 days (20.5; 20.4; 19.6 and 18.5, respectively, in groups) in 268 patients (285 patients with postoperative mortality of 17 cases).

Analysis of the survival of 183 patients (monitoring other cases going on), depending on the type of surgery showed the following results: the 5-year survival rate after surgery McKeown — 21,5%, Ivor-Lewis — 16,2%, TCE + VATHE — 10.1% (Figure 4.)

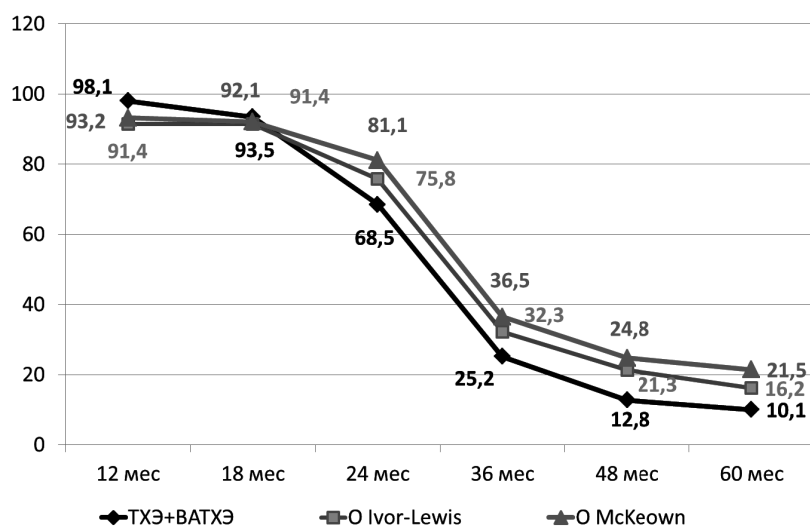


Figure 4. The survival rate of patients with esophageal cancer.

### Conclusions

1. Application mini invasive procedure at the stage of selection of the esophagus and mediastinal lymph node dissection, video-assisted, endoscopic operating technique allows to observe the principles of oncological surgery, significantly increases the value of lymphadenectomy performed, hemostasis, reduces the risk of damage of structures without increasing the overall trauma surgery.

2. Video-assisted TE enables early mobilization of patients after surgery (less pain due to lack of access thoracotomy), early restora-

tion of function of the respiratory system.

3. Minimally invasive surgical interventions in patients with esophageal cancer have widely introduced into clinical practice specialized hospitals that have extensive experience in performing the traditional interventions of similar scope. We are convinced that in the near future minimally invasive radical surgery will take a more active position in the structure of surgical interventions in patients with tumors of the gastrointestinal tract.

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## Remodeling the left heart chambers in patients with arterial hypertension and chronic kidney disease

**Abstract:** The objective of the research is to study the structural and functional condition of the left heart chambers in patients with chronic kidney disease (CKD). The research involved 254 patients; the main group consisted of 214 CKD patients and the control group included 40 people to compare. The patients in the main group suffered from CKD of the third stage (eGFR with 30–59 ml/min/m<sup>2</sup>). The arterial hypertension and the decrease of eGFR were the criteria to enroll the patients in the study. The present research has shown that in case of CKD, the left heart chambers remodeling is observed that manifests by disturbance of early diastolic filling, myocardium hypertrophy, dilatation of the cavities and the tendency to decrease systolic LV functions correlating with a decrease in filtration functions of the kidneys and intensity of secondary hyperparathyroidism.

**Keywords:** Chronic kidney diseases, arterial hypertension, left ventricular hypertrophy.

**Aim:** The objective of the research is to study the structural and functional condition of the left heart chambers in patients with chronic kidney disease (CKD).

### Material and Methods

The research involved 254 patients; the main group consisted of 214 CKD patients and the control group included 40 people to compare. The patients in the main group suffered from CKD of the third stage (eGFR with 30–59 ml/min/m<sup>2</sup>). The arterial hypertension and the decrease of eGFR were the criteria to enroll the patients in the study. According to etiology, chronic glomerulonephritis was diagnosed in 178 patients of the main group, chronic pyelonephritis was diagnosed in 26 patients; the etiologic diagnosis was not made to the rest 10 patients. Diabetes and other endocrinological diseases, systemic vasculitis, valve lesions and congenital heart defects, non-sinusoid pace maker (imposed rhythm, fibrillation, idioventricular rhythm), neoplasia, acute infectious diseases, diseases of the central nervous system, and the refusal of the patient to participate were the criteria of exclusion of the patients from the research.

The clinical picture in patients with CKD consisted of classical symptoms: arterial hypertension was found out in 100% of patients, edema — in 167 patients (78.04%), skin itching and peripheral neuropathy — in 72 patients (33.64%). Such impairment of the central nervous system as encephalopathy, tremor, muscles cramps and impotency was observed in 115 patients (53.74%); the reduction of muscle mass and arthropathy were found in 53 patients (24.77%). The GIS impairment manifested as nausea, anorexia, pancreatitis were observed in 119 patients (55.61%). The impairment of the

cardiovascular system like angina pectoris, cardiac arrhythmia and pericarditis were diagnosed in 160 patients (74.77%), the blood system impairment in the form of anemia and thrombocytopenic purpura were found in 172 patients (80.72%).

The comparison group consisted of two cohorts of patients: the ones with arterial hypertension (AH) without any kidneys damage (the AH group of 20 patients) and healthy volunteers with the healthy kidneys and cardiovascular system (the CG of 20 people).

The groups differed in the age of the members: the representatives of the AH group were significantly elder than the ones from the CKD and CG groups (<0.001 for both comparison groups) which did not differ from each other. According to the level of AP, SAP and DAP, the AH group significantly ( $p < 0.001$ ) exceeded the index characteristic for the CG. In the CKD group, AP significantly exceeded not only the average value in the CG group ( $p < 0.001$ ), but also in the AH group ( $p < 0.01$ ). The filtering function of the kidneys was preserved and comparable in the AH and CG. It was diminished in the CKD group ( $p < 0.001$  in comparison with both groups) that was a criterion to include the patients in the research. All the patients with CKD have taken the standard basic therapy for at least three months before the start of the research, though AP was not completely controlled. The basic therapy [1] consisted of valsartan, i. e. angiotensin receptor blocker II of type 1 in the dose of 160 mg a day, aspirin, i. e. antiagregant in the dose of 100 mg a day, and according to the indication: loop diuretics (in edema syndrome), carvedilol, i. e. beta-adrenoblocker (in tachycardia and other rhythm disorders), atorvastatin (in dislipidemia), allopurinol (in hyperuricemia over



800 mg/dl). All the patients were also recommended to keep diet (low-salt, hypoproteinemic one in proteinuria and microalbuminuria), avoid physical activities (sparing regime, obligatory day rest in a horizontal position) and weight-control [2].

At the time of enrollment in the research all patients had the documented diagnosis of CKD S3 made on the basis of eGFR determined by the serum concentration of creatinine calculated using the CKD-EPI formula of 2009, in modification of 2011 (the on-line calculator was used at <http://nefrosovnet.ru/>).

When the patients were included in the research, the serum concentration of creatinine and the serum level of cystatin, the universal marker of the kidney function, were determined in all the patients; simultaneous eGFR calculation based on cystatin were made: GFR=90.63, cystatin S-1.192 (Hojs R. et al. Clin Nephrol 2008; 70 [1]: 10–7.).

The research included determination of the osteoporosis marker, i. e. parathyroid hormone and the parameters of central hemodynamics using Echo CG.

The kidney filtration function was determined by the clearance of endogenous creatinine calculating the rate of glomerular filtration using SKD-EPI formula, 2009, in modification of 2011 (the on-line calculator was used at <http://nefrosovnet.ru/>). The concentration of creatinine was evaluated in the blood taken from the cubital vein. The blood was taken at 8–11 a. m. on empty stomach when the patient was sitting or lying. In the previous day the patients were recommended to avoid physical activities and food rich with protein. The blood was centrifuged to obtain the serum in which the concentration of creatinine was determined by Yaffe's modified method of [3]. This method is based on measuring the optic density of the painted creatinine complex with picric acid.

The second method to determine the kidney filtration function is calculation of GFR using the serum concentration of cystatin.

The marker was determined in the same blood specimen as creatinine. After centrifugation and serum separation, ELISA assay was used. It was followed by calculation of the GFR = 90.63 x cystatin C — 1.192 (Hojs R et al. Clin Nephrol. 2008; 70 (1):10–7.).

Osteoporosis markers were determined in peripheral blood plasma [4]; the samples were taken on an empty stomach at 8–11 a. m. in the sitting or laying position after 30-minute rest. It was recommended to avoid excessive physical activity and alcohol in the day before and the day of blood sampling as well as smoking for an hour before blood sampling.

The parathyroid hormone concentration was determined by electrochemiluminescence ELISA using Cobase 601 (Roche) [5].

EchoCG was made by an ultrasonic scanner with the phased detector at 3.5–5 MHz frequency. The examination was made when the patient was lying on his back or left side. The study was conducted in the standard positions: left parasternal one on the long axis of the left and right ventricle, on the short axis at the level of the ends of the aortal valve shutters, the ends of the mitral valve shutters, heads of papillary muscles, the left ventricle apex, as well as apical two-, three-, four- and five-chamber, subcostal and suprasternal positions.

The following indicators were registered [6]: the structural parameters (the parasternal position on the long axis of the left ventricle), the front-back size of the left atrium (LA), end-diastolic and end-systolic diameters (EDD and ESD) of the left atrium with calculation of end-diastolic and systolic volumes of the left atrium by Teichgolz formula because the geometry of the left atrium was preserved. In addition, the thickness of the left atrium walls (IVS and LVPW) was determined. The LV myocardium mass was calculated by Penn's method with subsequent indexation to the area of the body surface.

To determine the LV systolic function the fraction of LV ejection was calculated by the standard formula ( $LV\ EF = (EDV - ESV) / EDV \cdot 100\%$ ).

To study LV diastolic function the duration of the phase of LV isometric relaxation (LV IRP) and the maximum speed of early and late diastolic filling (E and A) were registered and their correlation (E/A) was calculated. The obtained findings were used to determine the types of diastolic filling and diastolic dysfunction.

After termination of the observation period the entire collected information was tabulated into Excel's spreadsheets for statistical processing. The mean arithmetic values, mean standard error, reliability of intergroup difference were calculated using Student's criterion for paired and unpaired differences. For multiple comparisons, Bonferroni correction was used. The qualitative signs were evaluated by the frequency of occurrence in the groups with calculation of intergroup differences using the Chi-square criterion. The correlation analysis was made using Pearson correlation coefficient and its significance was determined by the reliability tables.

#### Results of the research and discussion

EchoCG revealed significantly thicker LV walls ( $p < 0.001$  in diastolic thickness of the IVS and LVPW) in AH patients in comparison with the CG; it resulted in an increase in LVMMI ( $p < 0.01$ ). This occurs due to LV heavier afterload which characterizes the pathogenesis of remodelling heart under the conditions of arterial hypertension. The LV diastolic function determined by transmitral diastolic flow was characterized by a significant increase in the duration of the isovolumic relaxations phase ( $p < 0.01$ ) and reduction of the correlation of the maximum speeds of early and atrium filling phases ( $p < 0.01$ ). The LV systolic function characterized by LV EF in AH patients was not disordered (Table 1).

In the CKD patients, all EchoCG indicators were comparable to the parameters characteristic for AH because the remodelling processes are triggered by the same mechanisms: an increase in afterload due to raised AP and activation of the renin-angiotensin-aldosterone system (RAAS). The additional factor is liquid retention and an increase in the volume of circulating blood that resulted in an increase in preload of the heart that manifested, besides hypertrophy (an increase in IVS thickness by 29.67% and LVPW by 35.23% and LVMMI by 125.54% in comparison with the CG;  $p < 0.001$  for all three indicators), by dilatation of the chambers: LA by 12.35% and LV by 19.21% ( $p < 0.01$  reliability of the LA difference in the CKD and CG groups and  $p < 0.001$  reliability of LV EDD difference). A greater than in AH increase in RAAS activity, including the tissue one, leads to calcium myocardiocyte resetting and mitochondria deficiency. The first manifestation of this process is an increase in rigidity of the myocardium and disorder of the processes of active diastolic relaxation (an IRP increase by 37.50%,  $p < 0.001$  compared with the CG) and a compensatory increase in the contribution of atrium filling (reduction of E/A correlation by 29.75%,  $p < 0.001$  compared with the CG) and development of hypertrophic type of diastolic dysfunctions. Subsequently, calcium resetting and activation of local RAAS and also cavities dilatation due to the preload lead to reduced contractile function of myocardiocytes. Our research recorded a relative decrease in LV EF in the CKD group in comparison with the CG ( $p < 0.05$ ) though the absolute value remains within the nominal norm. The additional contribution to disorder of systolic and diastolic functions is made by impairment of the mineral exchange and vascular and metastatic calcification and endothelium dysfunction leading to myocardium hypoxia and increased energy deficiency.

Table 1. – EchoCG indicators in patients with AH and CKD

Healthy	Healthy, statistical error	AH, statistical error	CKD, statistical error	Healthy- AH	Healthy-CKD	AH-CKD
LA	3,32±0,11	3,52±0,16	3,73±0,07	not sig.	P<0,01	not sig.
LV EDD	4,53±0,14	4,96±0,24	5,40±0,09	not sig.	P<0,001	not sig.
IVSd	0,91±0,03	1,22±0,06	1,18±0,03	P<0,001	P<0,001	not sig.
LVPWd	0,88±0,03	1,20±0,06	1,19±0,03	P<0,001	P<0,001	not sig.
LV EF	64,60±1,94	64,25±2,05	58,34±1,01	not sig.	P<0,05	not sig.
E MV	0,74±0,04	0,81±0,04	0,89±0,03	not sig.	P<0,01	not sig.
A MV	0,50±0,04	0,86±0,04	0,96±0,03	not sig.	P<0,01	not sig.
E/A	1,21±0,12	0,87±0,10	0,85±0,08	P<0,01	P<0,001	not sig.
IRP	71,25±2,98	88,95±4,01	97,97±1,94	P<0,01	P<0,001	not sig.
LVMMi	82,08±6,83	152,27±21,37	185,12±9,31	P<0,01	P<0,001	not sig.

Distribution of the patients by the types of diastolic dysfunctions has revealed (Figure 1) the comparable number of patients with hypertrophic type of LV diastolic dysfunctions in the AH and CKD groups (over 80%) and reliable prevalence of people with

normal diastolic function in the CG group (Chi-square 3x2=53.46, p <0.001). Pseudo-normal and restrictive types of diastolic functions were found in none of the groups.

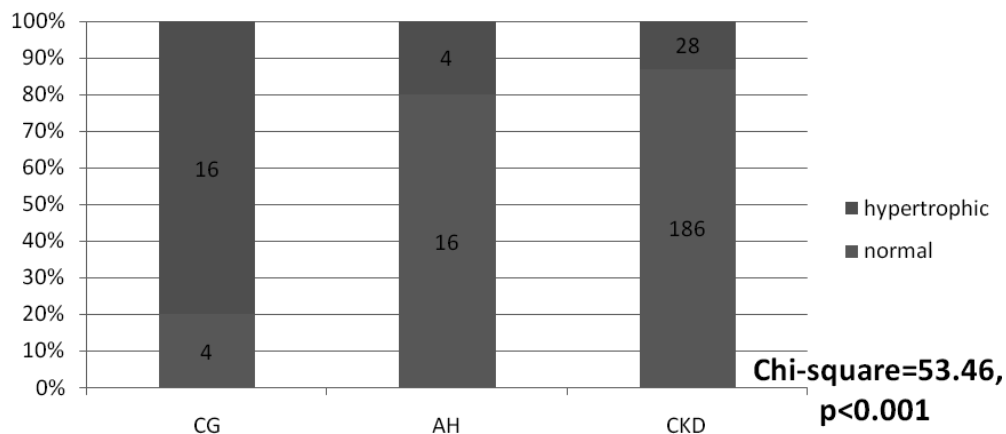


Figure 1. Distribution of controls and patients with AH and CKD depending on diastolic dysfunction types

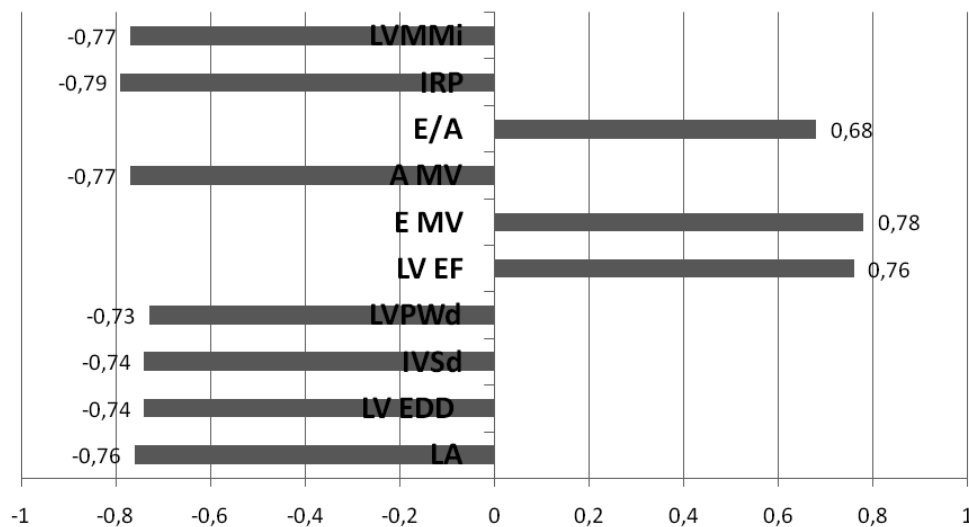


Figure 2. Coefficients of correlation between eGFRsync and EchoCG indicators

Note: reliability of all the indicated Pearson's correlation coefficients is p<0.001.

The correlation analysis in the CKD group (Figure 2) has found out a significant positive relation of eGFRsync with indicators of the LV systolic function (LV EF) and early diastolic filling (E and E/A).

To evaluate the contribution of various factors in LV remodeling we have studied the interrelations between the EchoCG parameters and serum concentration of parathyroid hormone and the AP

level. Reliable positive relations of parathyroid hormone concentration with structural indicators of the left chambers of the heart were revealed and negative ones with the systolic function and parameters of early diastolic filling (Figure 3) reliable relation between EchoCG parameters and AP level wasn't found out.

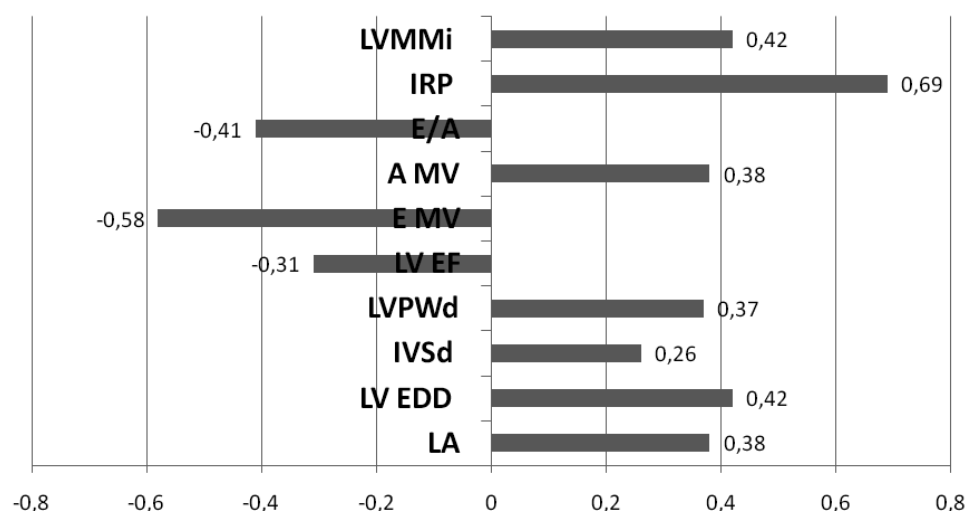


Figure 3. Coefficients of correlation between the parathyroid hormone serum concentration and EchoCG indicators

Note: reliability of all indicated Pearson's correlation coefficients is  $p < 0.001$ .

Thus, the present research has shown that in case of CKD, the left heart chambers remodeling is observed that manifests by disturbance of early diastolic filling, myocardium hypertrophy, dilatation

of the cavities and the tendency to decrease systolic LV functions correlating with a decrease in filtration functions of the kidneys and intensity of secondary hyperparathyroidism.

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## Post-Stroke Seizures in Children: incidence and clinical features depending on the type of stroke

**Abstract:** A total of 157 children with stroke were included in this study. Early post-stroke seizure were seen in 68 (43.3%) of patients. 52 of 122 (42.6%) patients with hemorrhagic stroke and 16 of 35 (45.7%) ischemic stroke patients had seizures as presenting. Most commonly witnessed seizure type was partial seizure in 50 (51.5%) of patients while 47 (48.5%) had generalized seizures. Analysis of generalized and partial seizure type between hemorrhagic and ischemic stroke patients showed no statistically significant difference ( $p > 0.612$ ;  $p > 0.315$ ).

**Keywords:** seizures, epilepsy, risk factors, stroke, children.

**Background.** Seizures are the most common pediatric neurologic disorder, with 4% to 10% of children suffering at least one seizure in the first 16 years of life [1–3]. Also, seizures one of the common presenting symptom in neonates and children with stroke. However, few data are available regarding the epidemiology of acute symptomatic seizures or the risk for later epilepsy. Estimates of seizures at presentation or in the early or acute period range from 18% to 50%, but definitions of acute symptomatic seizures or early symptomatic seizures vary [4–6].

Stroke is the most common etiology of epileptic seizures and epilepsy in children. Stroke in children are rare conditions, with incidence rates among two and eight per 100,000 children up to 14 years, and most cases show an underlying disease such as heart diseases, prothrombotic conditions, sickle-cell disease, and vascular malformations [7; 8].

Hemorrhagic stroke, subarachnoid hemorrhage, and cerebral venous sinus thrombosis (CVST) are associated with a higher risk of early seizures than is ischemic stroke [8–10].

Stroke results in a 23-to 35-fold increase in seizure incidence [3,10,11] and the risk of epilepsy increases 17-fold [12,13]. The risk of seizure after stroke is probably the same as in the general population after a first unprovoked seizure [4; 10; 14] and withholding AEDs till a second seizure occurs may not be harmful. Remote seizures and epilepsy, including medically refractory epilepsy, are common after perinatal stroke. Neonatal seizures are associated with nearly 3-fold increased remote seizure risk [2].

Although general guidelines exist for the diagnosis and the treatment of epilepsy, no specific recommendations are available concerning the management of seizures related to stroke in children. This is an underestimation as seizures occurring at stroke onset were not taken in to account and non-convulsive spells are rarely recognized as such. Risk factors, diagnosis, management and treatment will be different according to the time of onset of the seizures in relation to the stroke [13; 15].

#### Objective

To analyze the incidence and clinical features of post stroke related seizures in children depending on the type of stroke.

#### Study design and subjects

In this study, we assessed 157 patients with ischemic and hemorrhagic stroke, who had been admitted in pediatric neurology subspecialty service, Tashkent City Children's Hospital #1, Uzbekistan between February 1, 2015, and December 30, 2016. Data was collected regarding type, onset and frequency of the seizure, radiological findings regarding type, location and nature of stroke; gender and co-morbidities. Information gathered from history, examination and radiological findings, as on computed tomography (CT scan) or magnetic resonance imaging (MRI), was entered in a proforma especially designed for the study.

#### Statistical analysis

SPSS version 19 (IBM, USA) was used for all analyses. Descriptive statistics were applied to calculate the frequencies and percentages of categorical variables such as gender, nature of stroke and type of seizures. Mean  $\pm$  standard deviation was calculated for continuous variables like age. Pearson's chi-square test and Fisher exact tests were applied accordingly to find relationship between the time of onset of post-stroke seizures and other variables. P-value of  $<0.05$  was considered statistically significant.

#### Results

A total of 157 patients with stroke were included. There were 111 (70.7%) males and 46 (29.2%) females. For children, the median stroke onset age was 38 days (interquartile range [IQR], 27–50 days). One hundred twenty two (77.7%) had hemorrhagic

stroke (HS) and 35 (22.2%) had ischemic stroke (IS). The main findings and demographic data of the study summarized in Table 1.

Table 1. – Demographic data and main findings of the study

Age, stroke onset (Me, IQR), days	38 days (27–50)
Gender (M/F)	111/46
<b>Type of stroke:</b>	
hemorrhagic/ischemic	122/35
perinatal/childhood	47/110
<b>Complaints:</b>	
anxiety	106 (67.5%)
breastfeeding take-over	77 (49%)
seizure as presenting	68 (43.3%)
vomiting	56 (35.5%)
<b>Stroke etiology:</b>	
coagulopathy	96 (61.1%)
arteriovenous malformation	6 (3.8%)
unknown	49 (32.1%)
<b>Radiological findings:</b>	
Isolated IPH	48 (30.5%)
IPH with IVH extension	77 (49%)
Isolated IVH	32 (20.32%)

Abbreviations: IPH, intraparenchymal hemorrhage; IVH, intraventricular hemorrhage.

Fifty-two of 122 (42.6%) patients with hemorrhagic stroke had seizures as presenting. Most common site in affected persons was the cerebral cortex (13/20; 65%), followed by basal ganglia (5/20; 25%). Most commonly affected cortical regions were parietal and temporal accounting for approximately 40% each from cortical hemorrhages. Sixteen of 35 (45.7%) ischemic stroke patients developed seizures. Most common involved arterial territory was pure middle cerebral artery (MCA) (70/97; 72%), followed by mixed middle and posterior cerebral arteries (9/97; 9%), and pure posterior cerebral artery (PCA) (6/97; 6%). Cortical involvement was noted in 75% of MCA strokes and 60% of PCA strokes.

Early post-stroke seizure were seen in 68 (43.3%) of patients. Rest of the subjects i. e. 97 (61.7%), experienced late-seizures. Most commonly witnessed seizure type was partial seizure in 50 (51.5%) of patients while 47 (48.5%) had generalized seizures. Thirty-one (31.9%) patients experienced more than two seizures. Status epilepticus was seen in only one subject (1.03%) who was a young male with a large intracerebral hematoma (Table 2).

Generalized seizures were seen in 36.08% patients in hemorrhagic stroke group as compared to 42.2% subjects with partial seizures. In the ischemic stroke group, 12.3% patients had generalized seizures versus 9.7% patients who had partial seizures. Most patients experienced more than one seizure; 56 (57.7%) in HS patients as compared to 18 (18.5%) in IS group. The only patient who had status epilepticus had early seizures within 24 hours of stroke onset.

Analysis of generalized and partial seizure type between hemorrhagic and ischemic stroke patients showed no statistically significant difference ( $p>0.612$ ;  $p>0.315$ ).

A large proportion of patients, 112 (71.3%) had hemorrhagic infarction as evidenced by CT scan or MRI brain. Of ischemic strokes, 27 (77%) had an arterial infarct while venous infarct was found in only 3 (8.5%) of the subjects who were all young females.

Table 2. – Characteristics of post-stroke seizures (n=97)

Clinical characteristics	HS (n=122)	IS (n=35)	$\chi^2$	P
<b>Type</b>				
Generalized	35	12	0.257	0.612
Partial	41	9	1.009	0.315
<b>Frequency</b>				
Single	20	3	1.331	0.249
Multiple	56	18	0.333	0.564
<b>EEG finding*</b>				
Abnormal background	38 (39.1%)			
Slowing/voltage attenuation	8 (8.24%)			
Epileptiform discharges	12 (12.3%)			
Normal	5 (5.1%)			

Abbreviations: HS-hemorrhagic stroke; IS-ischemic stroke. \* Not all children had initial EEG performed.

One hundred of the 117 (85.5%) patients achieved seizure control with one antiepileptic drug (AED), 16/117 (13.7%) required two AEDs and one (0.8%) patient required three AEDs. Valproic acid and Benzonalone were most commonly prescribed AEDs followed by carbamazepine. As basic of anticonvulsants in the treatment of post-stroke seizures were used Convulex® (Gerot Lannach, Austria). The emergence of a new form of valproic acid — Convulex in the form of drops for oral administration has made it possible to optimize its use in infants. High efficiency of Convulex, apparently caused by blocking sodium voltage-dependent channels and impaired release of excitatory neurotransmitters (glutamates and folate) in interneuronal synaptic gap in conditions cerebral hypoxia — ischemia.

EEG was performed in 89/157 (56.6%) and 58 (65.1%) had abnormal findings. Diffuse slowing of background activity was most common finding (38/89; 42.6%), followed by focal slowing (8/89; 8.9%). Epileptiform activity was noted in 12/89 (13.4%). Of these 12, 8 had focal activity and 3 had generalized activity.

#### Discussion

The relationship between seizures and stroke has been long recognized. Rate of seizure in the early period after stroke is significantly higher than adults. Typically, seizures are not the only manifestation of stroke, focal neurological deficit develops either simultaneously with onset of the stroke or immediately in postictal period.

The frequency of post stroke seizures has been reported from 5–10% in the West [4; 11; 13; 16; 17]. A slightly higher frequency i. e. 13% is reported from India [4]. A lower frequency is reported from China i. e. 3.4% [16]. We noted that 8% of our stroke patients

had post stroke seizures, which is close to earlier reports. Western literature reports a similar or higher frequency of seizures in hemorrhagic strokes as compared to ischemic strokes. Conversely, we noted a higher frequency of seizures in ischemic strokes i. e. 45.7% versus, 42.6% in hemorrhagic strokes. Reasons for this difference are not clear. Interestingly most frequent seizure type was partial. Which similar to some data showing a preponderance of partial seizures in post-stroke seizure [18; 19].

This study has a number of limitations including a relatively small number of patients with post-stroke seizures, which limits the ability to draw any causative associations among variables. Also this study lacks the EEG data, which might have helped us in identifying more seizures including non-convulsive seizures or status epilepticus; as well as the information regarding the antiepileptic treatment given to these subjects and their outcome. Therefore, larger-sized prospective studies are obligatory to improve the understanding of the post-stroke seizures and their impact on the person and society, translating into a better and evidence-based health care provision.

#### Conclusion

This study indicated that post-stroke seizures are quite a common problem in the management of children with stroke but they are usually single without recurrence. Ischemic stroke is the most common cause of post-stroke seizure, and partial seizure is the most common type. In addition, this study indicated that the initial 2 weeks after stroke carry the highest risk for stroke patients to have a seizure. Early diagnosis of stroke in children is very important and pediatricians should be aware of the lack of specificity of the symptoms to avoid late sequelae and improve life quality.

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## The role of allofibroblasts transplantation in cartilaginous tissue regeneration process

### Abstract:

**Aim of investigation.** Ground of embryonal allofibroblasts in the process of cartilaginous tissue regeneration.

**Material and methods.** Investigation is based on the study the results of stimulation cartilaginous tissue regeneration process in the conditions of embryonal allofibroblasts application in 24 experimental sexually mature rabbits in which the model of symphysis pubis rupture with its following recovery have been used. Pieces of cartilaginous tissue have been fixed in 10% neutral formalin and embedded in paraffin. Histological sections were colored with hematoxylin, eosin and by Van-Gieson. Experiments duration — 7, 14, 21 and 30 days.

**Results.** After pelvic bones symphysis pubis rupture, cartilaginous tissue is undergone alternative changes with following formation of lobulose chondromatous nodules of different sizes and sclerosis of surrounding muscular and osseous tissue. In the second series of experiment after pelvis symphysis pubis rupture and symphysis recovery with the help of cerclage, morphologic investigation results testify formation of mixed initial callus consisting of connective and chondromatous tissue elements. In the third series of experiment embryonal allofibroblasts were introduced into symphysis pubis rupture defect after its recovery by cerclage. It has been shown that within 4 weeks of experiment connective tissue having intensive basophil stain is formed in the area of symphysis pubis rupture. Connective tissue formation with following formation of cartilaginous cells have been also noted in surrounding soft tissue structures.

**Conclusion.** Cartilaginous tissue formation process in the area of symphysis pubis rupture in experiment testifies stimulating influence of allogenic fibroblasts on cartilaginous tissue regeneration process in the experiment and it creates premises for applying this method in clinical practice.

**Keywords:** embryonal allofibroblasts; cartilaginous tissue regeneration.

**Background**

Cultivated alofibroblasts are considered as a perspective way of connective tissue regeneration [1; 2; 3; 4; 5; 6]. There are reports of good clinical results after alofibroblasts transplantation [2; 3; 4; 7; 8; 6; 9]. The stimulation of reparative osteo- and chondrogenesis to be considered as one of the possible way of their applying [10; 5; 8; 6; 9]. But a serious analysis is required subject to many issues which can occur at implantation of received culture of cells.

Fibroblasts have mesenchymal origin and are morphologically characterized as cells of round fusiform flat form with processes and flat oval nucleus. Fibroblasts synthesize tropocollagen, collagen's precursor, intercellular matrix and basic substance of connective tissue, amorphic jelly-like substance filling space between cells and fibers of connective tissue and taking part in wound healing. Due to differentiation fibroblasts transform to less active mature cells — fibrocytes [2; 7; 8; 11].

Quantity of offered methods testifies about the necessity of going on search of more perfect, available, less cost-based ways of reparative osteogenesis stimulation which would allow to save advantages of traditional methods and to reduce their disadvantages [11; 12].

**Goal** — the experimental study of influence of embryonal alofibroblasts to the cartilaginous tissue regeneration processes.

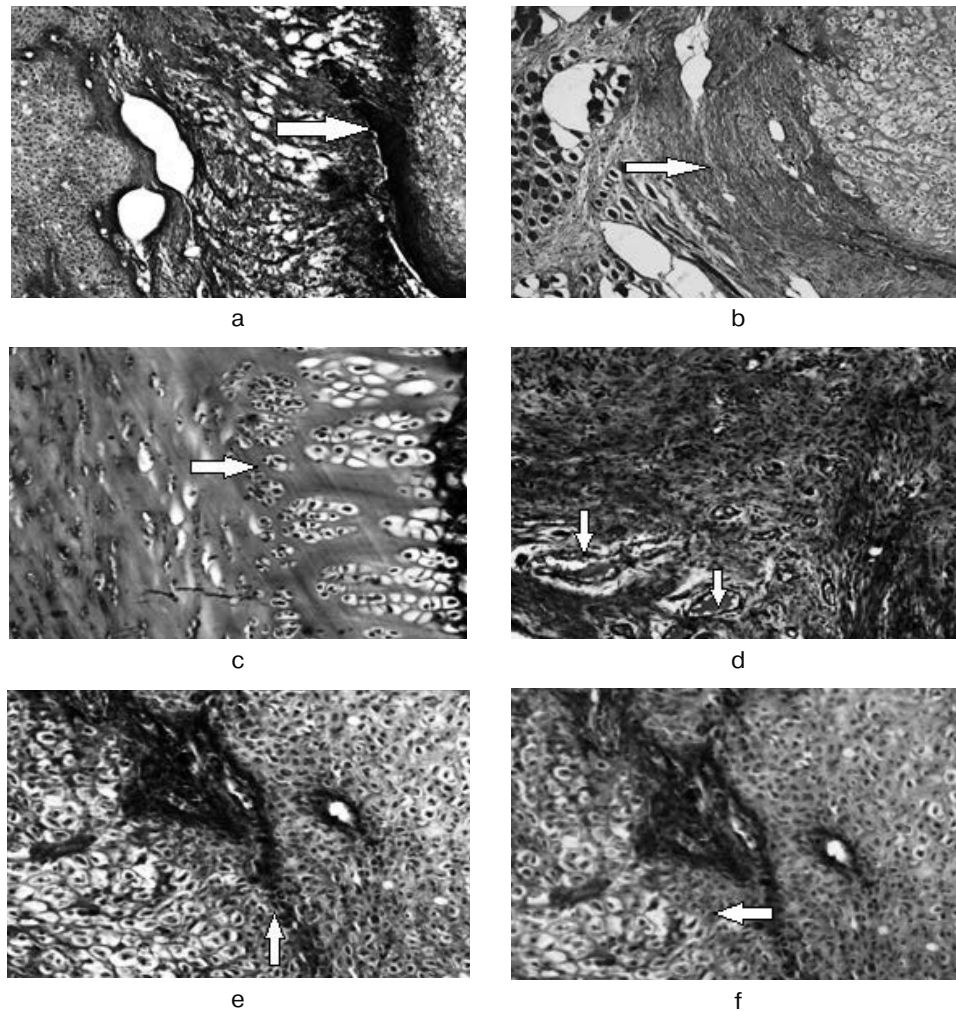
**Materials and Methods**

Investigation is based on studying results of stimulation of pelvic bone's joint cartilaginous tissue regeneration process stimulating due to applying embryonal alofibroblasts (AF) in 26 sexually mature rabbits of "Chinchilla" race with the weight of 2,3–3,5 kg.

For approximation of experiment to those pathologic conditions which are observed at pelvis injuries in human, there was created an experimental model of pubic joint rupture. Care and experimental animals keeping were standard in accordance with requirements and principles of European Convention (Strasbourg, 1986) and Helsinki Declaration of World Medical Association about humane treatment of animals (1996). Rabbits were bought from vivarium of Tashkent Medical Academy and kept in the vivarium of experimental department of Republican Research Centre of Emergency Medicine at 12 hours lighting, 20±2 °C room temperature, 50–70% humidity. Animals feeding was fulfilled according to prescribed ration with the use of mixed fodder. Animals have been divided into the following groups:

There were not underwent reconstructive-recovery surgeries in the first control group (8 animals) after pubic joint rupture.

There was underwent a symphysis restoration after pubic joint rupture with the help of cerclage from tantalum wire, 1,2 mm in diameter in the second group (8 animals).



Pic. 1. Cartilaginous tissue of symphysis pubis regeneration at different time points

Note: a – week 2. Necrosis and necrobiosis of cartilaginous tissue on the rupture border. Stained with hematoxylin and eosin (X10, 20.) b – week 4. Chaotic order of fibrous structures in cartilage and dense interlayers in fibromatous tissue. Van Gieson's stain (X10, 40). c, d – week 1. Local intracellular edema of cartilaginous tissue. Stained with hematoxylin, eosin (X10,40). e, f – week 3. Adhesion of defect between cartilaginous tissue stumps with formation of vessels and connective tissue in it. Stained with hematoxylin, eosin (X10,40).

In the third group (8 animals) there was also underwent a symphysis restoration after pubic joint rupture with the help of cerclage from tantalum wire, 1,2 mm in diameter, then in the area of injury a solution of grown embryonal allofibroblasts in the quantity of 30 ml with the help of 5 ml syringe without needle has been injected.

X-ray investigation has been performed before slaughter of animals.

After decapitation of experimental animals an intake of investigated part of pelvis has been carried out. Material has been fixed in 10% solution of neutral formalin (ph 7.2–7.4).

An experimental animal in sterile conditions has been fixed the back to desk with parted extremities. After intramuscular introduction of thiopental sodium 60 mg/kg, droperidol 2 mg/kg+fentanyl 0,04 mg/kg longitudinal incision by pubic joint view has been made. After dissection of skin, subcutaneous fat, symphysis was bare in the wound (it is necessary to mention that symphysis's height in rabbits reaches up to 2,5–3,0 sm. and width is 0,4–0,5 sm.). With the use of sharp straight raspatory a disruption of pubic joint has been carried out, with the help of straight surgical scissors and Mikulicz's clamp pelvis's half have been pulled apart and so instability of anterior semicircle of pelvis has been made. After d-bridement by betadin solution its layered closure has been carried out (Pict. 1).

Embryo intake has been made at the 3<sup>rd</sup> week of pregnancy, embryonic allofibroblasts were prepared by professor M. D. Uraz-

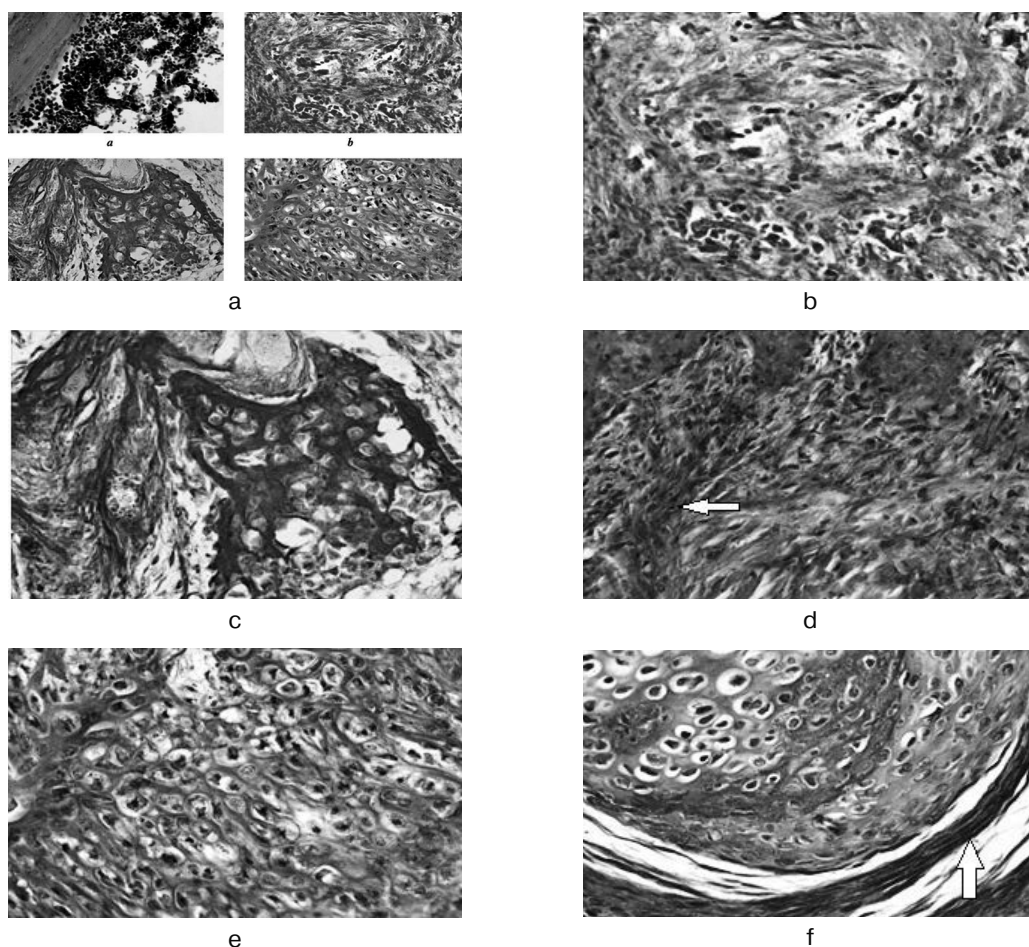
metova's method [13]. Slaughter of animals has been carried out by introduction thiopental sodium (90 mg/kg) with posterior de-hematizing by decapitation.

Histologic sections received on sledge microtome after dewaxing were colored by hematoxylin and eosin, collagenous fibers revealed by picrofuchsin by Van Gison (morphologic investigations were carried out at pathologic anatomy department of Tashkent Medical Academy).

### Results

In the first series of experiments a tentative model of pubic joint rupture has been created as a control and the process of cartilaginous tissue regeneration in the dynamics has been investigated during four weeks.

Morphological investigation results in the dynamics after creating pubic joint rupture showed that in early period of experiment cartilage defect is filled up with necrotic mass and blood elements, circumflex cartilaginous tissue primarily is underwent disorganizational, dystrophic and destructive changes, further inflammatory, reparative-regenerative process with following changes of both cartilaginous and circumflex soft tissues which is followed by appearance of proliferative infiltrate in interstitia and around vessels with forming lobulose chondromatous nodules of different sizes and fibromatosis of surrounding muscular, connective and bone tissue (Pic 1. a, b).



Pic. 2. Cartilaginous tissue of symphysis pubis regeneration during different periods after allotransplantation of fibroblasts (3rd series of experiment)

Note: a – week 1. Allofibroblasts replanting. Allofibroblasts adoption in cartilaginous tissue depth. Stain with hematoxylin, eosin (X10, 40). b – week 2. Allofibroblasts replanting. Formation of initial granulation callus from allofibroblasts and local tissue elements. Stain with hematoxylin, eosin (X10, 40). c, d – week 3. Neogenic chondromatous tissue with big quantity of fibrous structures. Van Giesonstaining (X10, 40). e, f – Detection of fibrous structures in neogenic chondromatous tissue surrounding each chondrocyte. Van Giesonstaining (X10, 40).



In the second series of experiments after pubic joint rupture, recovery of symphysis was undertaken with the use of cerclage from tantalum wire, 1,2 mm in diameter. Morphologic investigation results showed that during the 1<sup>st</sup> and the 2<sup>nd</sup> weeks of experiment connective tissue and vascular elements were formed in the rupture's zone with following adhesion of cartilaginous tissue. Development of active regenerative processes both in cartilaginous and surrounding connective tissues as proliferation of young cellular elements of fibro- and chondrocyte origin and also an increasing of basic intercellular substance testifies about forming of mixed primary callus consisting of fibrocyte and chondrocyte tissue elements (Pic 1. c, d).

In the third series of experiments the mass of stem fibroblasts has been put into defect of the rupture of pubic joint cartilaginous part and the process of cartilaginous tissue regeneration has been investigated. Morphologic investigation results during four weeks showed that at initial period necrobiosis development of allofibroblasts some part has been noted and another part of them being activated move into the depth of cartilaginous tissue. From the second week of experiment transformation of allofibroblasts into fibroblasts and chondroblasts with forming neogenic bands of fibro- and chondromatous tissue has been noted. Further the forming of lobulose structures from neogenic cartilaginous tissue has been observed and its two layers are formed by the fourth week. There is a neogenic tissue in the defect zone, it is more intensively colored by hematoxylin into basophilic color and in circumference is embodied with old cartilaginous tissue in which cells hypertrophy and hyperplasia have

been observed. It is necessary to mention the fact that in dynamics of experiment proliferation, hypertrophy and hyperchromatism of fibroblasts and osteoblasts nucleus with thickening of bone beam have been observed from **endoost** side. Regeneration of fibromatous tissue with the following transformation into cartilaginous tissue has been noted from surrounding soft tissue structures (Pic 2.).

#### Conclusion

Hereby, study of forming new cartilaginous tissue in pubic joint rupture area in the experiment under allofibroblasts influence has shown that concerning changes taken place in the control group, cartilaginous tissue formation occur earlier mainly due to transplanted fibroblasts and formation of cartilaginous and partially bone tissues on 21–30 days of experiment prove that. Therefore, we have made a conclusion about stimulating influence of allogenic fibroblasts on cartilaginous tissue regeneration process course in the experiment and it creates prerequisites for applying this method in clinical practice.

#### Resume

1. Healing of cartilaginous defect in the conditions of stimulation with replanting allogenic fibroblasts, cartilaginous tissue is formed in the same sequence as in the control group.

2. Regeneration process starts earlier under allofibroblasts influence and passes more active and ends by 21–28 days of cartilaginous tissue forming.

3. Allogenic fibroblasts can be recommended for application as chondrogenesis stimulations.

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## Analysis of medical and social consequences of drug dependence according to a long catamnesis

**Abstract:** Complete rejection of the drug, followed by long-term remission is most likely with a small (up to 5 years) experience of drug use, and the occurrence of adverse social impacts, particularly single conviction for offenses related to drugs for some patients, apparently, plays the role of a factor contributing to the formation of motivation to stop drug addiction.

**Keywords:** addiction, medical social consequences, remission, death.

The urgency of the problem. The severity of the medical social consequences of drug dependence is emphasized by many researchers. The authors note the low level of employment of drug addicts, a high risk of violent and criminal behavior, violation of intrafamily relations [1; 5]. In the families of drug addicts frequent problems of emotional deprivation, low material level, alienation [3; 6]. More than 90% of patients, at least one commit a criminal offense and brought to trial almost one in three of them. According to experts of the World Health Organization, injecting drug users are at risk for tuberculosis, HIV/AIDS, sexually transmitted diseases [2]. There is an acute problem of drug users mortality [7], and its most common causes are considered accidents, poisonings and injuries, as well as diseases of the internal organs [8; 10]. The average life expectancy of opium drug users on average 7–10 years since the start of the reception.

It is believed that severe health and social consequences of opioid dependence determine its poor prognosis [4].

After analyzing the numerous studies of opioid abuse, carried out over the last 25 years, J. Parsons [11] reported that approximately one-third of drug users dying prematurely, about one-third continued anesthesia of varying intensity, and one-third of overcoming dependence with access to the persistent long-term remission.

In general, the study of long Catamnesis suggests that a typical manifestation of the dynamics of opioid dependence in a large proportion of cases are either giving up using drugs or opiate substitution by other psychoactive substances. In this connection it is maintained interest in studying the trends, outcomes and medical social consequences of drug addiction.

**Purpose of the study.** the study of health and social consequences and outcomes of drug addiction according to 15-year-old catamnesis.

**Material and Methods.** The object of the study were 484 people (414 men and 70 women) with a diagnosis of drug addiction, registered Tashkent city narcological clinic on January 1, 2001. To analyze the health and social consequences and outcomes of drug dependence undertaken continuous study of medical records (out-patient cards, stories hospital illness, archival materials, excerpts from psychiatric hospitals, acts of judicial Addiction expert), which made it possible to trace the fate of the patients according to the regular dynamic observation on over the next 15 years.

**Results of the study.** Analysis of the data of 15-year-old catamnesis showed that 47 patients (9.7%) in different periods of observation have stopped attending drug treatment clinic, 60 patients (12.4%) went outside the city of Tashkent and the Republic of Uz-

bekistan in connection with what their fate It could not be traced in recent years. At the same time it found that 43.4% of migrants to the moment of departure has been ascertained state of stable remission lasting more than three years. Depending on the nature of the medical and social consequences of the remaining 377 patients were divided into three groups. The largest group (199 patients, 52.8%) were drug addicts convicted in 2001–2015 GG for offenses related to drugs. This group consisted of 181 men and 18 women.

Depending on the nature of the medical and social consequences of the remaining 377 patients were divided into three groups. The largest group (199 patients, 52.8%) were drug addicts convicted in 2001–2015 GG for offenses related to drugs. This group consisted of 181 men and 18 women.

In studying the history of convictions, their frequency was distributed data is not evenly. The largest part (91.5%) were convicted of drug addicts in the period from 2001 to 2005, and 56.3% of them — in 2001, when the spread of drug abuse in the Republic of Uzbekistan was of epidemic. Over the next 5 years (2007 to 2010) to 3.5% held criminally liable, from 2010 to 2015–2.5% of drug addicts, included in this group.

The majority (96.5%) of drug users, convicted of the offense, abused drugs opium, heroin in particular (83.4%), 3.5% were cannabis users. The vast majority (81.4%) had experience of drug use no more than five years: 17.6% of patients — up to 1 year, 42.7% — 2–3 years, 21.1% — 4–5 years. In 18.6% of drug addicts duration of disease was more than 5 years, and in 10.0% of patients it exceeded 10 years. In the early stages of drug use 19.6% of drug users have attempted on their own or after treatment to stop the anesthesia, but the duration of abstinence periods, usually no more than 3–6 months. Persons convicted of offenses in the period 2001–2005, to 80.4% of drug addiction different course without remission. In 29.4% of persons convicted in the following years, marked remissions lasting more than 1 year in the course of the disease.

Only 34.2% of drug addicts were prosecuted for the first time in my life. In 65.8% of the patients already had a criminal record, including for offenses not related to the drug. Some of them (48.7%) were prosecuted by 2–3 times, 17.1% — more than 3 times. The majority (59.8%) of the patients were married or living in a civil union, 38.7% were single, divorced comprised only 1.5% of patients.

The second largest group (106 patients, 28.1%) were persons who have completely stopped taking any substance that allows you to diagnose the state of the counter (over three years) of remission,

which equates to recovery followed by the termination of follow-up. This group included 95 men and 11 women.

Compared with the previous group, among patients with persistent therapeutic remission significantly less dependence was detected only on opiates (78.3%;  $p < 0.001$ ) and increasing the frequency of the abuse of cannabinoids (16.0%;  $p < 0.001$ ). At 5.7% of the patients diagnosed as substance dependence.

The majority of drug addicts (77.4%,  $p > 0.05$ ), duration of drug abuse to counter the formation of remission did not exceed 5 years, with no statistically significant differences on the basis of the previous group was not found.

In 24.5% of patients, it was up to 1 year, at 28.4% — 2–3 years, 24.5% of patients — 4–5 years. Much less often (22.6%,  $p > 0.05$ ), drug abuse experience, mainly cannabinoids, over 5 years. At 6.6% of the patients it was 6–8 years, 5.7% — 9–10 years, at 7.5% — 11–15 years and 2.8% of patients — more than 15 years.

No significant between-group differences in terms of family adaptation of drug addicts. The majority of patients who discontinued use of narcotic substances, the previous family ties: 51.9% of the patients were married, 48.1% — lived in the parental home ( $P > 0.05$ ).

Many patients (77.4%) had a history of convictions for offenses related to drugs, but in most cases (47.2%;  $p < 0.045$ ) were prosecuted more than once. More than one previous conviction had a 30.2% ( $p < 0.001$ ). 22.6% of patients never prosecuted.

Third, the least numerous group (72 patients, 19.1%) accounted for addicts who cause the termination of the dynamic observation was fatal. This group included 58 men and 14 women. Studying the cause of death showed that 20.8% of patients died from drug overdose, 16.7% — from pulmonary tuberculosis complications, 9.7% — from AIDS, 9.7% — as a result of accidents, 8.3% — from cirrhosis of the liver. Suicide accounted for 5.6% of all cases of death, with the same frequency (5.6%) as the cause of death was revealed acute cardiovascular insufficiency (myocardial infarction). Other causes of death

(cancer, pathology of the gastrointestinal tract, kidneys, meningoen- cephalitis, etc.) Totaled 23.6% of the total number of deaths.

Comparative analysis of the severity of the clinical manifestations of drug addiction, prior to death, discovered the existence of certain differences from the previous group. Patients in this group was significantly more likely to be diagnosed with dependence on opiates (93.3%;  $p < 0.001$ ) with a smaller proportion of cannabinoid dependence (8.3%,  $p > 0.05$ ), and a lot of dependency on opiates and other substances (5, 6%,  $p > 0.05$ ).

As in the previous group, the majority of drug addicts (66.6%,  $p > 0.05$ ), duration of drug abuse before death did not exceed 5 years. In 20.8% of patients with lethal outcome was observed against the background of persistent (over 3 years) abstinence from substance use.

However, compared to the previous group with respect to increasing frequency of prolonged (more than 5 years) opioid drug abuse or cannabinoid group (33.4% of patients;  $p > 0.05$ ). Half (50.0%,  $p > 0.05$ ) of the patients were married, 47.2% ( $p > 0.05$ ) were living in the parental home, 2.8% — were widowed. Conviction for offenses related to drugs, had 19.4% of the patients ( $p > 0.05$ ), with respect to increasing frequency of convictions of more than one half (41.7%,  $p > 0.05$ ). We do not have a criminal record 19.4% ( $p > 0.05$ ) patients.

Thus, among the most frequent adverse health and social consequences of drug addiction can be isolated conviction for offenses related to drug and deaths as a result of overdoses and diseases of internal organs. However, long-term follow-up observation is quite a high probability of a complete cessation of substance use, followed by the formation of a stable long-term remission.

When opioid adverse health and social consequences occur in the early stages of the disease. Criminal liability is the case, especially in those patients who show no desire to stop drug receptions and is biased toward delinquent behavior is due to the anesthesia.

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## Assessment of the prevalence and characteristics of smoking status of teenagers and young men in Tashkent

**Abstract:** A study of prevalence and its impact on respiratory status among 1817 teenagers and young men. The results of the survey showed that the prevalence of Smoking among adolescents and young men is 17.7%. Examine the relationship of smoking with respiratory symptoms and condition of function of external respiration in 109 people. In the course of the survey established that there was a significant correlation between indicators of respiratory function, smoking and respiratory symptoms.

**Keywords:** smoking status, teenagers, young men, respiratory symptoms, respiratory function.

Tobacco use is one of aggressive risk factors that lead to early development of diseases which society is a large social burden. Widespread tobacco consumption in various countries leads to a decrease in life expectancy of the population, as proven by many research studies, both domestic and foreign authors [4; 2, 7–12]. In recent decades Smoking among individuals of adolescence has become widespread, with no specific differences among persons, male and female. WHO estimates more than 150 million adolescents worldwide use tobacco and this number is steadily increasing. Currently, about 5.4 million people die each year from diseases related to Smoking, which is the single leading preventable cause of death [3, 147–149]. It is projected that number will increase to 8 million per year by 2030. If the trend continues, the majority of deaths happen in developing countries, where every year die more than 7 million people in a result of diseases related to tobacco, and this is more than from malaria, injuries, and living conditions together [1, 33–36].

Every fifth person in the world — a teenager, a way of life instilled at a young age, be sure to give results at the age of Mature, able-bodied. Habits such as tobacco Smoking, lack of physical activity impact on the formation of various diseases, including chronic, leading to early disability, to decrease in indicators of respiratory function and, consequently, lower efficiency, tolerance to physical activity, early formation of chronic diseases of the respiratory and cardiovascular systems [5, 1477]. It is known that the development of an addiction to nicotine occurs most rapidly at a young age [6, 611]. Therefore, the main audience for the active prevention of smoking I think young people, teenagers, including the problem of the formation of addiction to tobacco acquired in the last decade, the nature of the epidemic.

One of the major gaps in the successful solution of the problems of harm reduction from Smoking is the lack of a clear, scientifically-based complex algorithm (tactics) risk management related to Smoking tobacco.

**The aim** of the study was assessment the prevalence of smoking among teenagers and young men and its relationship with respiratory symptoms and respiratory function.

**Material and methods:** 109 people have carried out a thorough examination, including determination of respiratory function: forced expiratory volume in 1 second; forced vital capacity; vital capacity; the maximum instantaneous flow rate during exhalation of 25%, 50%, 75%; peak expiratory flow (PSV), using the “Master-Lab” firm Erich Eger (Germany). Criteria of chronic obstructive pulmonary disease and Smoking were established on the basis of the who questionnaire: chronic bronchitis in the presence of cough with phlegm almost every day for three months in the year, irregular

cough — for cough with phlegm in the morning and/or during the day or night in the cold season, respiratory symptoms in the presence of regular or irregular cough, respiratory disorders — based on the presence of respiratory symptoms and/or disorders of respiratory function, as measured by the criteria of Clement, R. F., Smoking regular Smoking at least one cigarette per day. For statistical processing of material was used statistical analysis and information delivery SAS (Statistical Analysis System).

**Results and discussion:** The results of the survey showed that active smokers among students of the College are 17.7% of the people, ex-smokers, 20.3% of non-smokers and 62%. Among non-Smoking patients had in their lives of the cigarettes 76%. Thus, 40% of respondents had or currently have a history of Smoking. The average age of onset of Smoking among students was  $16.2 \pm 2.6$  years. It should be noted that among all respondents, 2.5 percent purchased their first Smoking experience at the age of 10 years, 54.7% of students started Smoking between the ages of 11 to 16 years. Thus, 57.2% of College students started Smoking in school age. The average “pack/years” among smokers was 1.5 (2, 5; 4) tutu/years. The average “pack/years” among ex-smokers was 0.4 (0,1; 1,25) packs/years. Data analysis showed that the majority of patients have mild nicotine dependence was 35.5%, while 5.4 percent have a high dependence on nicotine. A high percentage of respondents have a strong motivation to quit Smoking (41%).

Comparison of indicators of external respiration function in persons with chronic bronchitis, with occasional cough and no respiratory symptoms (%of expected values) showed that the mean values of almost all parameters of function of external respiration in the group of persons with irregular cough was significantly lower than in individuals without respiratory symptoms. In individuals with symptoms of chronic bronchitis the value of the forced expiratory volume in 1 sec, maximum flow rate during expiration 50%, 75% and peak expiratory flow rate was significantly lower than in individuals without respiratory symptoms.

Analysis of the results of the study individuals with different status of Smoking with respiratory symptoms of varying intensity showed that the average indicators of function of external respiration was lower in smokers compared to the never Smoking group. However, this Association was statistically significant only for the parameters of the forced expiratory volume in 1 sec/forced vital capacity, maximum flow rate during expiration of 25% and peak expiratory flow ( $p < 0.05$ ).

We observed a statistically significant reduction of mean values of forced expiratory volume in 1 sec in smokers without respiratory symptoms compared to healthy non-smokers ( $p < 0.005$ ) and

smokers with occasional cough with phlegm ( $p < 0.01$ ), and smokers with chronic bronchitis ( $p < 0.001$ ), compared with healthy. Also revealed a significant decrease of forced expiratory volume in 1 sec in smokers with symptoms of chronic bronchitis compared to smokers without respiratory symptoms ( $p < 0.05$ ). There was a statistically significant relationship between the decline of forced expiratory volume in 1 sec/forced vital capacity in individuals smokers with chronic bronchitis compared with the other study groups: healthy ( $p < 0.0001$ ), with smokers having the irregular cough with phlegm ( $p < 0.05$ ), with non-smokers with chronic bronchitis ( $p < 0.05$ ) and smokers without respiratory symptoms ( $p < 0.05$ ). Revealed similar link smoking with other speed performance of the forced exhalation. Rates of maximum flow rate during exhalation of 50% was significantly low, compared with "healthy", for nonsmokers, with occasional cough with phlegm ( $p < 0.01$ ), non-smokers with chronic bronchitis ( $p < 0.005$ ), smokers without respiratory symptoms ( $p < 0.01$ ) and smokers with chronic bronchitis ( $p < 0.0001$ ). The maximum volume rate during exhalation of 25% was significantly lower for nonsmokers with symptoms of chronic bronchitis than in healthy ( $p < 0.05$ ). The value of this parameter was significantly reduced in all smokers, without respiratory symptoms ( $p < 0.005$ ), and occasional cough with phlegm ( $p < 0.005$ ) and chronic bronchitis ( $p < 0.0001$ ), compared with "healthy". The average maximum flow rate during exhalation 75% was significantly higher in healthy compared with non-smokers, with intermittent cough with phlegm ( $p < 0.01$ ), non-smokers with chronic bronchitis ( $p < 0.005$ ), and also compared to smokers without respiratory symptoms ( $p < 0.001$ ), with occasional cough with phlegm ( $p < 0.01$ ), and chronic bronchi-

tis ( $p < 0.0001$ ). The parameter peak expiratory flow was significantly higher in healthy compared to non-smokers, with intermittent cough with phlegm ( $p < 0.0001$ ), with non-smokers with chronic bronchitis ( $p < 0.0001$ ) and also compared to smokers without respiratory symptoms ( $p < 0.0005$ ), with occasional cough with phlegm ( $p < 0.001$ ) and chronic bronchitis ( $p < 0.0001$ ). Smokers with symptoms of chronic bronchitis, the parameter peak expiratory flow were also significantly lower than in smokers without respiratory symptoms.

Thus, a significant relationship between indicators of respiratory function, Smoking and respiratory symptoms. The relationship of indicators of function of external respiration with the combination of Smoking and respiratory symptoms were highly significantly significant for all parameters of respiratory function, and more pronounced than the relationship of respiratory function only with the status of Smoking.

#### Conclusions:

1. The results of the survey showed that the prevalence of Smoking among adolescents and young men is 17.7%.

2. We found a significant relationship between the indicators of external respiratory function, Smoking and respiratory symptoms, indicating that the rate of progression and severity of symptoms depends on the exposure to the etiological factors and their summation.

3. There is significant inverse correlation between bronchial hyperresponsiveness and forced expiratory volume in 1 second, which indicates a close relationship between hyperactivity and the risk of developing chronic obstructive pulmonary disease.

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## Comparative analysis of tubercular lymphadenopathy clinical pattern in hiv and non-hiv patients

**Abstract:** 156 patients suffering from tuberculous lymphadenopathy (TL) were examined at the Republican AIDS Center and the Republican Specialized Applied Research Medical Center of Phthiology and Pulmonology. based on the obtained results we suggest on the apparent exacerbation of TL in case of HIV infection.

Thereat, symptoms changed along with the rapid development of HIV terminal stage. The clinical signs of TL in HIV-infected patients include a great variety of symptoms of local and general origin. TL course as compared with that in non-HIV patients especially in the progression stage is far severer and contributes to the mortality in patients reported with such comorbidity.

The clinical pattern features of concurrent TL and HIV-infection have been associated with the progressive formation of infectious and toxic syndrome.

**Keywords:** tuberculous lymphadenopathy, HIV-infected patients.

HIV outbreak is the global health-related challenge. In AIDS-patients (acquired immunodeficiency syndrome), tuberculosis is the most often opportunistic infection that makes 50–78% of the total pulmonary infection cases [6]. The underlying condition for high tuberculosis morbidity in HIV-infected is almost 100% contamination with the *Mycobacterium tuberculosis* in the adult population.

In most cases, the tuberculosis (TB) secondary to the progressive immune deficiency is followed by the process generalization [3; 8]. In this view, extrapulmonary tuberculosis is the significant clinical challenge as the HIV infection runs epidemic. The incidence rate of extrapulmonary tuberculosis, including tuberculous lymphadenopathy, is globally reported to be associated with the HIV-infection spread. Most authors recognize the difficulty to diagnose tuberculosis in HIV-infected patients [1; 2]. The diagnostics is made difficult as the TB of extrapulmonary type develops in AIDS-patients in 50–70% cases [9]. Of clinical forms of extrapulmonary tuberculosis in HIV-infected patients, lymphatic system organs (tuberculosis of intraperitoneal and retroperitoneal lymph nodes in 24.4% cases, of spleen — in 16.0% cases, of peripheral lymph nodes — in 12.8% of patients) are most affected.

The HIV infection is characterized by the so-called persistent generalized lymphadenopathy. Most cases of the generalized lymphadenopathy in HIV-infected are associated with the outburst of opportunistic infections in the stage of deuteropathies, especially at the stage of AIDS. In 73.5% cases of HIV-infection, the tuberculous lymphadenopathy (TL) is most frequently reported at the 4C stage, in 23.5% cases (approximately 3 times less) TL is reported at the stage 4B and single cases of TL are reported at the Stage 3 of this disease. TB and related case mortality in HIV-infected and AIDS patients is extremely high and ranges, as per international authors, within 22% to 34.1%. TB was reported in patients who died of HIV-infection ( $\frac{1}{3}$  cases) and in the majority of them (86.7%), TB was the immediate cause of death [5].

Nowadays, due to the high lymphadenopathy prevalence of various etiology, TL diagnosis remains the challenging and urgent issue of phthisiology [7]. It is still unknown whether the lymphadenopathy results from the more common specific involvement of lymph nodes with TB mycobacteria or it is caused by other infections.

In this context, the study of clinical and laboratory pattern of TL in HIV patients and non HIV-patients is urgent.

**Purpose of Study.** To assess the progress of TL pattern in HIV-infected and non HIV-infected patients, as well as to specify the clinical course and disease progression behavior.

**Study Material and Methods.** 156 patients suffering from tuberculous lymphadenopathy (TL) were examined at the Republican AIDS Center and the Republican Specialized Applied Research Medical Center of Phthisiology and Pulmonology: 99 subjects were non HIV-infected (Group 1), 57 — HIV-infected (Group 2). TL was diagnosed based on specific clinical, radiologic, ultrasonography patterns, bacteriological analysis results and lymph node punctate cytology, histology results of lymph node biopsy, presence of pulmonary tuberculosis or other TB-infected organs. The *Mycobacterium tuberculosis* (MTB) was identified by the microscopy analysis with samples stained by Ziehl-Nielsen and Gene Expert and cultures inoculated to the standard Lowenstein-Jensen medium.

The HIV infection was verified by detection of specific Ab to HIV by ELISA and immune blotting to HIV proteins of type

1. Clinical stages of HIV infection were classified as per V.I. Pokrovsky, as approved by the Order № 166 dd. 17.03.2006 of the Ministry of Health of RF; the AIDS was diagnosed in case of positive HIV results and the account of CD4+ — lymphocytes to be below 200 cells/ $\mu$ l.

The statistical analysis was performed based on MS Excell-97, MedStat, and the package of STATISTICA-99 Edition. To assess polygenic characters, the values of arithmetic mean and standard error of the mean were determined and the evidence frequency value was specified to assess qualitative characters. In case of normal distribution, differences in mean values in comparison groups was assessed as per the Student criterion. In case of deviation in the normal distribution, the data obtained was presented as the median and the reliability of differences was assessed by the nonparametric Wilcoxon-Mann-Whitney test.

**Study Results.** It is revealed that females prevail among HIV-infected and non HIV-infected patients with TL (Fig. 1 and 2). So, the female subjects amounted to  $63.6 \pm 4.8\%$ , accordingly, in Group 1 ( $P < 0.001$ ) and  $57.9 \pm 6.5\%$ , accordingly ( $P > 0.5$ ), in the Group 2.

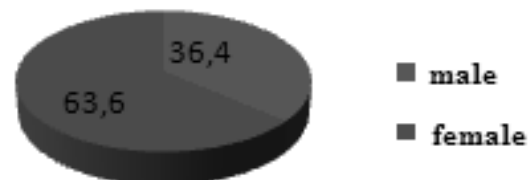


Figure 1. Gender identity of non HIV-infected patients with TL, n (%)



Figure 2. Gender characteristics of HIV-infected patients with TL, n (%)

Young and middle-aged prevailed among the HIV and non HIV-subjects (Figure 3). Patients aged 21–30 were 2.7 times more often reported in the Group 1 as compared with the Group 2 subjects ( $37.4 \pm 4.8\%$  and  $14.0 \pm 4.5\%$ , accordingly,  $P < 0.001$ ). On the contrary, middle-aged and elderly patients prevailed in the Group 2. So, in the Group 2, patients aged 31–40 were reported at 2.1 times more often, those aged 41 and older — 1.3 times more often than patients in the Group 1 ( $50.9 \pm 6.6\%$  and  $24.2 \pm 4.3\%$ , accordingly,  $P < 0.001$ ;  $35.1 \pm 6.3\%$  and  $26.3 \pm 4.4\%$ , accordingly,  $P > 0.5$ ).

At the date of inclusion of HIV subjects in the study, the following clinical forms of pulmonary tuberculosis were diagnosed: focal (7.0%,  $n = 4$ ), infiltrative (8.8%,  $n = 5$ ).

During the study, non HIV-infected patients were reported to be diagnosed with the following clinical forms of pulmonary tuberculosis: focal (8.1%,  $n = 8$ ), infiltrative (4.0%,  $n = 4$ ) and disseminated (4.0%,  $n = 4$ ). The disseminated pulmonary tuberculosis is not common in HIV-infected patients in the pattern of clinical forms of tuberculosis.

Table 1. – Age pattern of HIV-infected and non HIV-infected patients with TL, n (%)

Age, years	Non HIV-infected patients	HIV-infected patients	Statistical significance, P
Up to 20	12 (12.1 ± 10.7)	–	–
21–30	37 (37.4 ± 4.8)	8 (14.0 ± 4.5)	P<0.001
31–40	24 (24.2 ± 4.3)	29 (50.9 ± 6.6)	P<0.001
41 and older	26 (26.3 ± 4.4)	20 (35.1 ± 6.3)	P>0.5
Total	99 (100.0)	57 (100.0)	–

When studying clinical signs in HIV-infected patients, complains were reported as follow: fatigue in 63.2% cases (n = 36), drenching sweat — 75.4% (n = 43), fever — 73.7% (n = 42), loss of body weight at 10 kg and more — 87.7% (n = 50), diarrhea — 22.8% (n = 13). Clinical signs in non HIV-infected patients were

less pronounced, the patients complained of the fatigue in 34.3% cases (n = 34), drenching sweats — 10.0% (n = 10), fever — 40.4% (n = 23), body weight loss at 10 kg and more — 18.2% (n = 18), diarrhea is not reported.

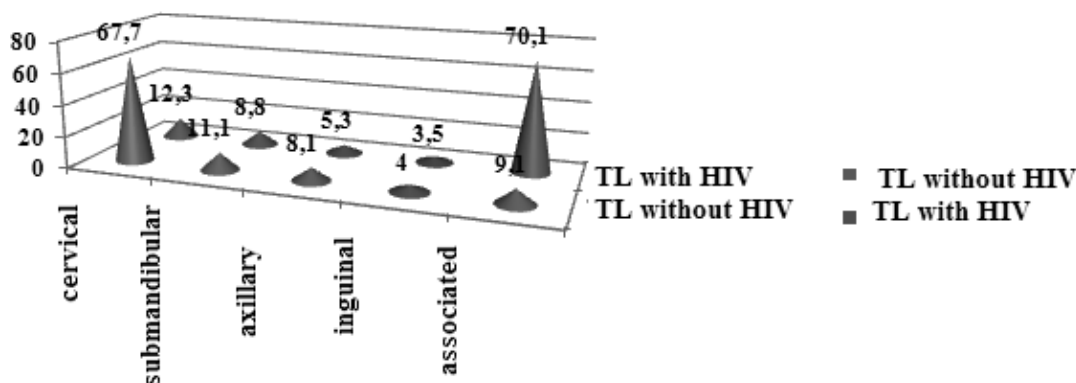


Figure 4. Distribution by prevalence of TL patients with and without HIV infection, n (%)

The chronic viral hepatitis C was among the concurrent diseases in HIV-infected patients to make 24,6% (n = 14) cases against the rate in non HIV-infected patients that made 3.0 (n = 3).

Localization of TL is shown in Figure 4. The figure shows that cervical lymph nodes were 5.5 times more often affected in non HIV-infected patients as compared with HIV-infected patients (67.7% and 12.3%, accordingly, P<0.001). Lymph node coexistent affection was 7.7 times more often reported in HIV-infected patients than in non HIV-infected patients (70.1% and 9.1%, accordingly, P<0.001).

Re-examination of histologic specimens showed that pathologic pattern features in case of TL are primarily determined by

the active phase of inflammatory activity in the lymph node. M. V. Chulochnikova (2005) identified three phases of active inflammation of tuberculous lymphadenopathy based on morphological features. We distinguished 3 phases of active inflammation in HIV and non-HIV patients (Figure 5). The figure shows that the inactive phase is 5.5 times more common in non-HIV patients than in HIV-infected patients (29.3% and 5.3%, accordingly, P<0.001). On the contrary, the active phase and the progression phase are 1.5 and 1.3 times more common in HIV patients as compared with non-HIV patients (19.3% and 13.1, accordingly, P>0.5; 75.4% and 57.6% accordingly, P<0.02).

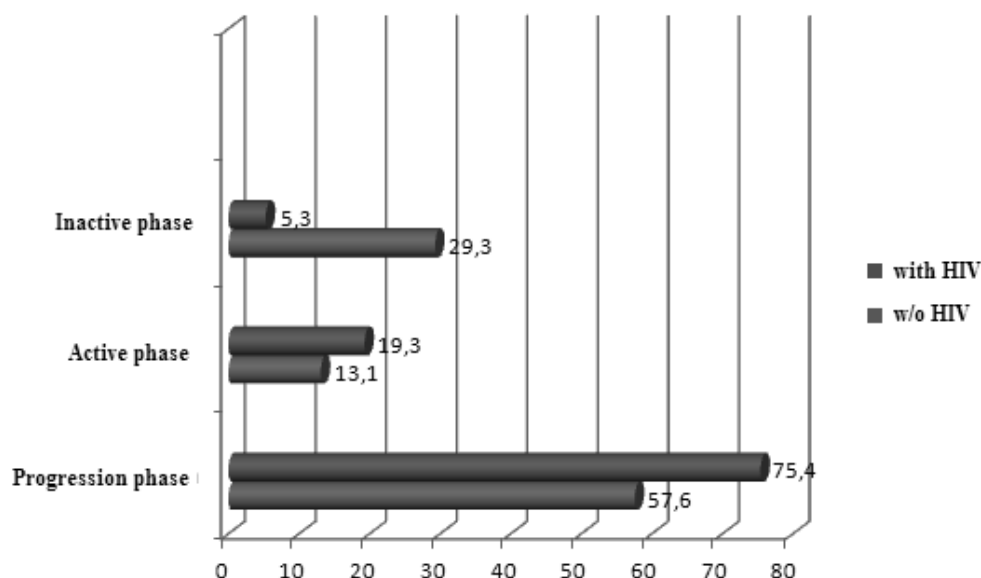


Figure 5. Comparative characteristics of process phases in HIV and non-HIV patients with TL, n (%)

During the follow-up period, 9 (15.8%) HIV-infected patients died. Neither subject died in the Group 1. By comparing fatal cas-

es against other patients treated in the department, differences in the inflammatory activity were identified. Thus, all patients who died

were reported to be in their progression stage. The fatality occurred resulting from multiple organ failure with symptoms of severe intoxication. It should be noted that 5 (55.6%) patients were diagnosed with pulmonary tuberculosis and 3 (33.3%) patients — with Hepatitis C.

Thus, based on the obtained results we suggest on the apparent exacerbation of TL in case of HIV infection.

Thereat, symptoms changed along with the rapid development of HIV terminal stage. The clinical signs of TL in HIV-infected patients include a great variety of symptoms of local and general origin. TL course as compared with that in non-HIV patients especially in the progression stage is far severer and contributes to the mortality in patients reported with such comorbidity.

The clinical pattern features of concurrent TL and HIV-infection have been associated with the progressive formation of infectious and toxic syndrome.

#### Conclusion:

1. Significant differences in clinical and laboratory signs and stages of tuberculous lymphadenopathy have been identified in HIV-infected patients. Tuberculous lymphadenopathy in HIV-infected patients is much severer with concomitant diseases that

develop much more frequently and aggravate the underlying disease than those in non-HIV patients.

2. The progressive stage of tuberculous lymphadenopathy with generalization and lethality is reported in 15.8% cases.

3. TL in absence of HIV infection as compared with TL with HIV infection is clinically more favorable, it is known for limited lesions and, most importantly, for limited caseous-necrotic changes.

4. Having analyzed the histologic pattern of lymph nodes removed in HIV-infected patients, we identified three types of tuberculous lymphadenopathy activity: inactive phase (with prevalence of productive cell response) in 3 patients (5.3%), active phase (predominantly with productive-necrotic tissue reaction) in 11 patients (19.3%), pathology progression phase (mostly necrotic lesions, supuration and fistula formation) in 43 patients (75.4%).

5. It is found that the inactive phase is 5.5 times more commonly reported in non-HIV patients as compared with that in HIV patients (29.3% and 5.3% accordingly,  $P < 0.001$ ), whereas the active phase and progression phase were 1.5 and 1.3 times more commonly reported in HIV patients as compared with that in non-HIV patients (19.3% and 13.1, accordingly,  $P > 0.5$ ; 75.4% and 57.6%, accordingly,  $P < 0.02$ ).

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## Surgical treatment of foraminal herniated disc of the lumbar spine

**Abstract:** Herniated lumbar intervertebral disc have a significant impact on both the patient's life as well, and because of the high prevalence and economic impact on society as a whole. Designed scheduling algorithm foraminal hernia surgical treatment of lumbar intervertebral disc, based on the preoperative detection of compressing factors allows to define differentiated indications for decompressive or decompressive-stabilizing surgery.

**Keywords:** herniated disc, foraminal foraminal.

The urgency of the problem of hernias of lumbar intervertebral disc is made up of a number of reasons. First and foremost, the fact that the world is suffering from this disease a huge number of people — more than 80% of the world's population [1; 2]. And more often herniation of lumbar intervertebral disc found in developed countries where widespread sedentary, sedentary lifestyle.

The prevalence of disease in the population is 58–84%, and the incidence is 4–33% [9; 10].

The incidence of “low back pain” (low back pain) in the Netherlands amounted to 28 cases per 1000 population per year, and for low back pain with sciatica — 11.6 cases per 1,000 persons per year. Herniated disks are a common cause of back pain. This pain,



«low back pain», defined as pain localized in the back, the twelfth rib bounded above and below — the inferior gluteal folds [8]. In Russia, the prevalence of chronic back pain is estimated 26–33% of the adult population [1]. The incidence of “low back pain” (low back pain) in the Netherlands amounted to 28 cases per 1000 population per year, and for low back pain with sciatica — 11.6 cases per 1,000 persons per year. Herniated discs are a common cause of back pain. This pain, “low back pain”, defined as pain localized in the back, the twelfth rib bounded above and below — the inferior gluteal folds [8]. In Russia, the prevalence of chronic back pain is estimated 26–33% of the adult population [1].

Most herniated discs occur in the lumbar level (about 65%), at least — on the neck (30%), very rare (5%) — on the thoracic level. This is due to the fact that the formation of the herniated disc in most cases is the ultimate manifestation of a degenerative process. Moreover, different parts of the spine in varying degrees susceptible to degenerative changes and the formation of hernias.

Men suffer slightly more often than women [4]. Most of the patients are people of working age: 25–55 years. Often the disease is associated with their professional activities [2; 11].

Herniated lumbar intervertebral disc have a significant impact on both the patient's life as well, and because of the high prevalence and economic impact on society as a whole. This disease causes suffering — pain, neurological damage or make it impossible to minimize the ability to fully work up to 70% of patients. Given the high incidence in the state scale, this leads to temporary disability significant number of people, which inevitably leads to huge losses. In addition, the state spends huge amounts of money on the treatment and rehabilitation of such patients. Vertebral pathology in the general structure of morbidity with temporary disability ranked second, second only to respiratory infections, and up to 20–30% [4].

Each year the incidence is increasing. For example, Palmer et al. revealed an increased incidence in the UK from 1980 to 2000 [7].

In 2004, the American Academy of Orthopedic Medicine estimates that the average loss of the US budget caused by lumbar pain “low back pain” in most cases due to the herniation of lumbar intervertebral disc, is \$ 100 billion annually, including \$ 20 billion. As paying medical bills [4].

The first reports of reoperation after failed discectomy performed in the lumbar spine appeared in the 50s of the last century. Surgical treatment neurocompression forms of degenerative disc disease of the lumbar spine in most cases leads to an objective improvement of the patients. However, the pain after surgery is not always completely removed and, in some cases, there is worsening of neurological symptoms, leading to a deterioration in the quality of life of patients, reducing their efficiency and the need to further conduct a long rehabilitation treatment. According to the generalized data of world literature, the number of unsatisfactory results after discectomy performed various surgical procedures is 8–23% [5; 10]. Frequency conducted reoperation 5–18% [6]. The most common causes of failure is the formation microdiscectomy disc hernia recurrence, appearance of segmental instability, scar formation, adhesions, the remains of unidentified foraminal disc herniation, etc. Unsatisfac-

tory results after lumbar discectomy in foreign literature combined in FBSS term (failed back surgery syndrome). FBSS or LES (failed back surgery syndrome) — is the clinical condition of the patient, who despite holding one or more operations in the lumbar spine is marked resistant radikulopaticheskoy syndrome [5; 6; 11].

Depending on the location distinguish: median, paramedian and lateral herniated discs.

Lateral herniated discs — team group uniting hernia, located in mezhpozvonkovogo hole or laterally beyond (or foraminal and extraforaminal). Their rate is 4–20% of all hernias of the lumbar spine. Laterally raspolozhennye herniated discs differ from other vidov herniated discs diagnostic difficulty and operativnogo access, even with modern methods neyrovizualizatsionnykh, unsatisfactory results of surgical intervention.

Foraminal hernia of intervertebral holes located in that at the level of L4-L5 and L5-S1 disks are radicular channel length of 1.5–2 cm. Because of the massive articular processes and long radicular channel at these levels access to foraminal hernia is difficult, they often go unnoticed.

Nerve root ganglion and displaced cranially and dorsally compressed and the lower edge of the arc root. Migrations down as the hernia and prevents root sequester bottom arc. With this in mind, find foraminal hernia without appropriate preoperative diagnosis and specific surgical approach difficult.

Objective: To develop a surgical treatment of foraminal hernia of intervertebral discs of the lumbar spine.

#### Material and Methods:

We analyzed the results of treatment of 750 patients with herniated intervertebral discs, which were treated in the clinic Spine ASMI office in the period from 2012 to 2016. All the patients underwent CT and MRI studies. Of these, 90 patients were found to foraminal hernia. Men were 42 (46%) and 48 women (54%). The average age of patients sostavlyal- 40±2,7 years.

#### Results and discussion:

On the L5-S1 level foraminal hernia occurred in 41 patients (45.7%), the L4-L5 level in 38 patients (42.8%). In 10% of patients foraminal hernia found in the L3-L4 level. In 52% of patients laterilizatsiya foraminal hernia was left-handed, right-sided in 48%. The degree of pain was assessed by visual analogovogo scale — VAS. Patients to Your operation was 7,5±0,7.

Patients under endotracheal anesthesia was performed surgery: arkotomiya, medial facetectomy, discectomy and Foraminotomy with partial preservation of the yellow ligament. Operations were carried out under the operating microscope using microsurgical instruments.

In the early postoperative period, a decrease of pain according to VAS to 2,1±0,5, 6 months after the operation marked pain relief to 1.1±0.2 VAS.

Long-term results of microsurgical treatment were as follows: –74% excellent, 22% good and mediocre — 4%.

#### Conclusions:

Designed scheduling algorithm foraminal hernia surgical treatment of lumbar intervertebral disc, based on the preoperative detection of compressing factors allows to define differentiated indications for decompressive or decompressive-stabilizing surgery.

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## The clinical morphological characteristic normal premature placental separation at thrombophilia

**Abstract:** It is executed comparative complex clinical-morphological probe engaging studying of structural violations in 11 placentas, received at the premature birth which has advanced against a typical clinical picture premature placental separation

**Key words:** Thrombophilia, PPS, morphological of placenta, pregnant.

**Introduction.** Last achievements in the field of clinical immunology, endocrinology, haemastology, microbiology, virology have allowed to look at problem PPS at pregnancy as result haemotologic violations in system “mother-placenta-fetus” [1; 4]. Congenital and got external factors (the antiphospholipiding syndrome, virus infections) potential in pregnancy various thrombophilia violations owing to damage endothelium vessels. Gears of development of such conditions depending on acting causation the factor are not studied enough and represent doubtless scientifically-practical interest.

The special place is retracted hereditary thrombophilia which is one of the major factors contributing to violations of coagulation, since a stage of implantation and formation of a placenta [2; 5].

Correction of violations in system of a hemostasis at pregnant women with thrombophilia in formation of a placenta before end invazii throphoblastes is necessary for prolongation of pregnancy and preventive maintenance of the remote complications, such as heavy forms gestosis, placentary insufficiency, a delay of prenatal development of a fetal PPS [3; 7; 8].

Development of placentary insufficiency with blockade of formation new villus or angiogenesis calls violations of development of bodies and fabrics, especially kidneys, a brain, heart [6].

In connection with the above-stated there was a probe particular purpose:

**Aim:** To carry out the clinical-morphological analysis of placentas at the died fruits and newborns at PPS.

Research problems included the analysis of risk factors and definition of morphological criteria of chronic placentary insufficiency at thrombophilia.

**Materials and methods research:** At probe of placentas the microscopy and a semiquantitative estimation in comparison group (4 women with normal pregnancy and sorts) and in the main group of 11 women with premature отслойкой normally disposed placen-

ta (PPS) which term of pregnancy has made 28 weeks (3 woman), 30 weeks (2 women), 36 weeks (1 woman), 37 weeks (3 women), 38 weeks (1 woman), 40 weeks (1 woman) have been used macroscopy. At histologic probe of placentae, considering different terms of pregnancy, various morphological changes were observed. In comparison group placentae of healthy women with not burdened obstetrical the anamnesis were investigated.

At macroscopical probe of placentae of healthy women with term pregnancy (comparison group) uniform drop of a thickness of a placenta from the centre to periphery was marked. The mean thickness of placentae in the centre made  $23,7 \pm 0,5$  mm. Mantles fetal eggs had brilliant grey colour. The number of segments in placentae fluctuated from 12 to 18. Vessels on a fruit surface of placentae are sanguineous. On a placenta sectional view had dark red colour. The mean weight of placentae made —  $409,5 \pm 1,9$  rp. Placenta-fetal the index (PFI) was a parametre of pot-life of a fruit. At the adverse forecast parametres PFI were above 0,18 or more low 0,1) and made  $0,123 \pm 0,006$ .

The macroscopical characteristic of placentae of the main group with PPS indicated the significant changes shown in a kind circulation of frustration and changes of microcirculation, destructive changes, presence of heart attacks, hematomas and the centres calcification. The mean thickness of placentae in the centre made  $22,3 \pm 1,8$  mm. Mean weight of placentae —  $332,1 \pm 72$  rp., placental-fetus the index made —  $0,166 \pm 0,05$ .

For a visual estimation of placentae clinical-anatomic classification PPS on which is used revealed:

- Subhoriálnaja a hematoma (a hemorrhage under mantles) — in the given group — 3 supervision;
- The Regional hematoma (a hemorrhage on placenta bottom edge)-2 supervision;
- Retoroplatsentarnaja a hematoma (a hemorrhage under a placenta) — 2 supervision.

The subchorionic hematoma was characterised by a blood congestion between a placenta and amniotic a mantle. A regional hematoma — localisation of hemorrhages and a thrombosis in regional sine of a placenta. If the hematoma placed more close 10 see from the centre it made negative impact on a fruit because of squeezing of a fleecy tree. At a retroplacental hematoma the blood congestion was observed between a placenta and myometry. In an investigated material regional hematomas prevailed. The prescription of formation of hematomas was estimated by the developed technique and to criteries of pathomorphology [4].

Easily removed clots on a parent surface of a placenta, or a mention of a hematoma in the history of sorts were estimated as the hematomas which have advanced within days (on the average 3–5 hours). Microscopic such preparations were determined fatty, safe erythrocyti mothers. If thrombosis weights were friable and did not watch off from a surface of a placental fabric, and at microscopy there was a network of fibrinous threads, haemolysis erythrocyte, occurrence haemosiderin term of such hematomas was estimated within 1,5–2 days. If hematoma term was increased till 3–4 days thrombosis weights had dense communication with ambient fabrics. Histologic research it was observed total haemolysis of erythrocytes, haemosiderofagus, formation of extensive zones of fibrin, loss calcinosis and occurrence fibroblasts.

At probe of placentae in comparison group the morphological structure in the central, paracentral and regional zones corresponded to pregnancy term (from 38–40 weeks). On histologic shears were determined cotyledons, formed deckman villus and their bifurcations. The central part котиледона has been surrounded villus II and III order.

The of connective tissue layer charional plates is presented by a considerable quantity of the collagenic fibres going in various directions. Among cellular elements prevailed of fibrocytes. In a zone charional plates the most part of a fleecy tree has been presented deckman villus (figure 1). Deckman villus have been covered massively chorional of epithelium and had no sintsitio-capillary membranes. Strom mature deckman villus it is presented by collagenic fibres among which were distributed separate fibrocyts and macrofagus. Vessels had a structure of arteries and veins, or arteriola and venule according to calibre villus. On a circle of these vessels various quantity of capillary tubes placed. Adventitious large vessels without a clear boundary passed in surrounding stroma villus.

Terminal villus had thin epithelial a cover and capillary tubes with sinusoidum expansion of a gleam which took more than 50% from a total area stroms. The centres of ischemic heart attacks, quantity villus with dystrophic changes increased, in large villusax processes fibrinosis amplified, loss calcification was marked.

At microscopic probe in a placenta numerous lateral branches intermediate and terminal villus were determined reference villus. In many terminal villus sinusoidal transformation of capillary tubes and formation capillary membranes was marked. At 1<sup>st</sup> woman immaturity separate villus was marked. In the given placenta also there were the morphological changes indicating inflammatory process that was showed by the dystrophic phenomena, a congestion lymphocytes in decidual fabrics, in last huge multinuclear cages also were determined. At 2<sup>nd</sup> women of change in a placenta corresponded to a picture of pathological immaturity villus (chaotically disposed villus with dense sclerosis of stroms, a considerable quantity fibroblasts and a reduction of a capillary channel, and in monitoring group similar villus were absent).

At women, at term of pregnancy of 28 weeks, the mean weight of a placenta has made 250,3+4,5 grammes that corresponded to

normal parametres (increase in weight of a placenta within 7th month the mean thickness of placentae — 20+0,1 mm (makes from 110 to 250 gramme), at a norm from 18–20 mm.). PFI was above a norm (0,18) and has averaged 0,225+0,01 that indicated inadequacy of the blood circulation, all newborns with the given parametres have died in term from 2 about 6 days after a birth.

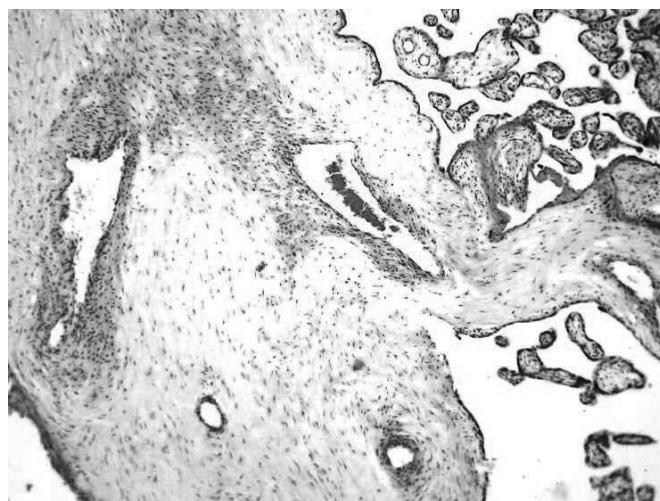


Figure 1. PPS. Deckman villuses with vessels. Painting haemotoxylinum and aeozinum

Intermediate mature villus in thGe generated placenta departed directly from primary and secondary deckman villus.

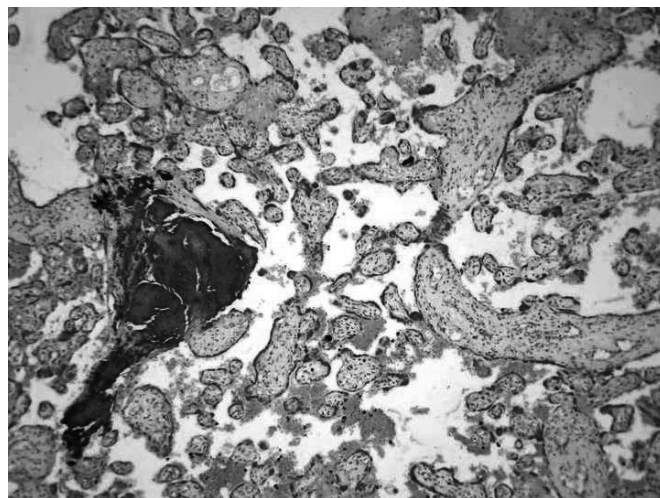


Figure 2. PPS. Loss calcificates in a mature placenta. Painting haemotoxylinum and aeozinum

Thus, in the main group at women at different terms of pregnancy from 28 till 40 weeks, significant morphological distinctions of structurally functional development of a placental fabric in difference from comparison group were determined. Various kinds of immaturity of a placental fabric have been determined in 6 cases (at term of pregnancy 28, 30 (2 cases), 36, 37, 38 weeks). Significant changes in weight and a thickness of placentae which would not correspond to a norm, at the indicated term of pregnancy, it has not been revealed: the weight and a thickness of placentae in the main group has averaged 332,1±72 gr and 22,3±1,8 mm, in comparison group 409,5±1,9 gr and 23,7±0,5 mm accordingly. Calculation placent-fetus an index has shown that in 4 of 11 occurred in the main group parametre PFI did not correspond to a norm and was above 0,18 that indicated frailty of fetuses (all 4 children have died). In group of comparison average indexes PFI have made 0,123±0,006.

Pathological changes were observed in a vascular channel and shown — arteriospazm, atherosclerosis, a thrombosis of vessels basal plates, perifocal necrosis decidua fabrics. It was marked complete blood interfleece space, came to light erythrocytes of stasis and extensive diapedesis hemorrhages in stratum intermediale and terminal villus. Presence of the central heart attacks in functionally active cotyledon the central and paracentral zones, testified to progressing flow of placental insufficiency.

Along with placental heart attacks formation of the interfleece blood clots hemorrhages from vessels villus chorion were which reason was marked. Hemorrhages were as очаговые, and diffuse that corresponded to formation of small interfleece blood clots. At long enough existence of interfleece blood clots there were signs of violation of blood circulation and a dystrophy in villus chorion with occurrence fibrinoides.

**Conclusion:** PPS it is combined with true heart attacks that testifies about causation generality of these pathological processes. Hyperactivation thrombocytes and increase coagulation potential against depressing antiposset gears, lead to development of thromboses and heart attacks in a placenta, provoke development hypoperfusion and placental insufficiency. PPS it is possible to attribute to sharp vascular violations as in a microscopic picture placental heart attacks, thromboses of vessels of a placenta, a placental bed, spiral arteries take place. The formation microthrombosis and microcirculation violations play an essential role in a pathology of spiral arteries and development obstetric the complications connected with change of maternal-placental blood circulation. Thrombophilia it is indisputable associated with vascular placental pathologies.

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## Studying of prevalence of the most significant urological diseases in the Aral Sea Area

**Abstract:** This article has enlightened the issues of study of prevalence indicators of the most significant urological diseases in the Aral Sea Area in the environment of initial link health services. Survey has been conducted in four rural-medical centers of the region. In order to carry out the inspection the representative sampling has been formed, where the both gender

personalities of the age of 1 year and older were included. In total 7597 people has been inspected that made 85,4% of the number subject to inspection. As a result of epidemiologic survey the level of true illness level of the population in the Aral Sea Area was established on certain nosological forms of urologic diseases. The analysis has shown that the most widespread among the population is the urine tract infection ( $10,75 \pm 0,36$ ), followed by pre-lithiasis ( $5,82 \pm 0,27$ ), BPH ( $3,37 \pm 0,21$ ) and urolithiasis ( $1,40 \pm 0,13$ ) per 100 surveyed. It should be noted that in no case the comparison of prevalence rate of urological diseases in Khorezm region and in the Republic of Karakalpakstan has revealed significant territorial indicators differences ( $p > 0,05$ ). Big importance in conduction of epidemiologic survey is given to involving to its fulfillment of initial health care link (general practitioners), as the most approached and having the possibility to carry out the early diagnostics of urological diseases.

**Keywords:** prevalence of urological disease, early diagnostics of urological diseases, urolithiasis, benign prostatic hyperplasia, urinal tract infection.

### Introduction

Data of the researches devoted to prevalence of illnesses of genitourinary sphere, concerns only separate nosological units or, as a last resort, their groups. Researches of prevalence of urolithiasis, benign prostatic hyperplasia (BPH), urinary tract infections (UTI), carried out at various times in many countries, in some extent and scale [1, 4–11; 4, 1150–1159] relate to them. Coverage of the data on the prevalence of diseases estimated on appealability of patients for the medical aid can be much wider, therefore objectivity of such data is relative, as appealability, in itself, depends on many factors (availability of medical aid, its quality, sanitary culture of the population, its mentality, etc.) and to present an integrated picture of true prevalence of diseases of organs of urinary ways and man's sexual sphere, not always is obviously possible.

Meanwhile, urological diseases, especially most significant of them — urolithiasis, UTI, BPH, widespread, reduce quality of life and cause disability in patients, demand the big expenses for treatment and after treatment and, as a result, turn around an essential material damage in Republic scales [3, 3–6; 5, 36–37; 7, 82–95].

For a situation assessment related to urological case rate, modern data on it, both according to the official statistical reporting, and by results of specially conducted epidemiological researches among the population is necessary.

The researches executed last years, including in Uzbekistan, have made the certain contribution to the resolution of a studied question [6, 20; 8, 41; 9, 37]. However, it is necessary to notice that a studying subject were only separate aforementioned nosological units and their groups [2, 36–38; 3, 3–6].

Other not studied aspect of a surveyed problem is definition of possibilities and a share of participation of a primary link of medical aid (general practitioner) in control of urological case rate. Planned research is localized in the Aral Sea Area which is a zone of ecological catastrophe and where it is necessary to give particular attention to the state of the population health, as well as to diagnostics of early stages of diseases, by elaboration of both medical, and preventive actions that in a bigger extent is connected with the activity of a primary link of public health services.

**The purpose of work** — an assessment of prevalence indicators of the most significant urological diseases in environmentally adverse Aral Sea Area.

### Materials and methods

Epidemiological research by cross-sectional study is carried out among the population served by rural-medical centre (RMC) "Avaz Utar" of Yangiaryk district and RMC "Uygur" of Yangibazar district of Khorezm region. In the Republic of Karakalpakstan are chosen RMC "Kirkkiz" of Ellikkala district and RMC "Cheremushka" of Nukus district. The population of the specified sites is surveyed by a continuous method.

The Republic Karakalpakstan and Khorezm region can be defined as the territories different on a complex of geographical (ecological) characteristics not only in the Republic of Uzbekistan, but also as a whole, in Central Asian region.

For research carrying out, a representative sample where persons of both sexes at the age from 1 year and older have been included has been generated. The population selected for epidemiological research represented a contingent of the countrymen, actually all life lived in the given area.

The case rate on appealability not always shows true level of diseases prevalence available for the population. It is known that a certain part of the population suffering chronic diseases, for whatever reasons do not address for medical aid though are in great need in it. In this connection to establish real prevalence of chronic diseases at the population according to appealability and current observation is often impossible. Based on this, for an assessment of true level of a case rate, in 2009–2011, employees of chair of urology of the Tashkent medical academy and the Republican specialized center of urology (RSCU) have organized an expedition. Together with general practitioners in the chosen sites complex medical examination of 7597 persons that has made 85,4% of the number subject to survey has been conducted.

At distribution of the population structure on gender and age groups, for the analysis of separate urological diseases we had been used the international classification of diseases — ICD-10 (1993) (Table 1).

Table 1. – Distribution of the surveyed population on gender and age

Sex	Male		Female		Total	
	n	%	n	%	n	%
Age	1	2	3	4	5	6
1–14	867	29,3	821	17,7	1688	22,2
15–19	293	9,9	482	10,4	775	10,2
20–29	469	15,8	1118	24,1	1587	20,9
30–39	484	16,4	882	19,0	1366	18,0
40–49	345	11,7	713	15,4	1058	13,9
50–59	264	8,9	439	9,5	703	9,3
60–69	132	4,5	109	2,4	241	3,2

1	2	3	4	5	6	7
70–79	91	3,1	66	1,4	157	2,1
>80	15	0,5	7	0,2	22	0,3
<b>Total</b>	<b>2960</b>	<b>39,0</b>	<b>4637</b>	<b>61,0</b>	<b>7597</b>	<b>100,0</b>

As it is seen on the table, the number of children, in total, has made 1688 (22,2%), persons of youthful age — 775 (10,2%). The overwhelming majority patients at the age from 20 till 69 years — 4955 (have made 65,2%), over this age — 179 (2,7%).

The universal questionnaire was applied to population inspection intended for definition of symptoms inherent to urological diseases specially developed in the Republican specialized center of urology. The questionnaire includes 33 questions concerning symptoms of the bottom urinary tract, infections of an urinary tract, an incontinence of urine, a pathology of man's sexual sphere. General practitioners of a primary link of public health services actively participated together with RSCU doctors in inspection of the population and questionnaire filling and conducted the physical survey of respondents.

With a view of screening of urological diseases ultrasonic scanner "Kransbühler" (Germany), with 3.5 MHz convex gage was used. At ultrasonic scanning (USS) of organs of urinary system paid attention to morphological changes of pyelocaliceal system and a parenchyma of kidneys (hydronephrosis, hydrocalycosis, cystic formations, tumors, etc.), ascertained signs of stones and salts conglomerates in kidneys cavities.

Urine analyses were carried out by a quick test by using of test-strips Urine-10 ("Cypress Diagnostics"). Microscopy of urine sediment was carried out when necessary.

BPH screening at men over the age of 50 was carried out using the following methods: poll of respondents on universal questionnaire, with filling of the questionnaire of the international assessment system of prostate disease symptoms; physical survey including external examination of organs of a scrotum and digital rectal examination of a prostate; ultrasonic research of kidneys, urinary ways and a prostate with an assessment of presence and volume of a residual urine, scoping of a prostate and an average flow rate of urine.

All patients, under the specified list, were invited to survey and inspection by special authorized employees of RMC. Control of the given procedure was carried out in interaction with local administration and a management of treatment-and-prophylactic establishments of the district.

#### Outcomes & discussion

Prevalence of the most significant urological diseases in the Aral Sea Area has made  $21,34 \pm 0,47$  for 100 surveyed, in Khorezm region —  $21,02 \pm 0,64$  cases, in Republic Karakalpakstan —  $21,69 \pm 0,69$  cases for 100 surveyed (Table 2).

Table 2. – Prevalence of separate urological diseases in the Aral Sea Area (on 100 surveyed)

Diseases	Khorezm region	Republic of Karakalpakstan	Average
Pre-lithiasis	$5,51 \pm 0,36$	$6,16 \pm 0,40$	$5,82 \pm 0,27$
Urolithiasis	$1,65 \pm 0,20$	$1,11 \pm 0,17$	$1,40 \pm 0,13$
UTI	$10,85 \pm 0,49$	$10,65 \pm 0,51$	$10,75 \pm 0,36$
BPH	$3,01 \pm 0,27$	$3,77 \pm 0,32$	$3,37 \pm 0,21$
<b>Total</b>	<b><math>21,02 \pm 0,64</math></b>	<b><math>21,69 \pm 0,69</math></b>	<b><math>21,34 \pm 0,47</math></b>

The analysis of level of a true case rate of the population in the Aral Sea Area under separate nosological forms of urological diseases has shown that among the population the infection of an urinary tract ( $10,75 \pm 0,36$ ) is most extended, it follows pre-lithiasis ( $5,82 \pm 0,27$ ), BPH ( $3,37 \pm 0,21$ ) and urolithiasis ( $1,40 \pm 0,13$ ). It is

necessary to notice that in one case, comparison of level of prevalence of urological diseases in Khorezm region and Republic Karakalpakstan has not taped significant territorial differences of indicators ( $p > 0,05$ ) (Table 3).

Table 3. – Prevalence of separate urological diseases in the Aral Sea Area depending on gender (on 100 surveyed)

Diseases	Khorezm region			Republic of Karakalpakstan			Totally		
	male	female	p	male	female	p	male	female	p
Pre-lithiasis	$5,37 \pm 0,57$	$5,61 \pm 0,47$	$>0,05$	$7,22 \pm 0,69$	$5,47 \pm 0,49$	$<0,05$	$6,25 \pm 0,44$	$5,54 \pm 0,34$	$>0,05$
Urolithiasis	$1,87 \pm 0,34$	$1,51 \pm 0,25$	$>0,05$	$1,27 \pm 0,30$	$1,00 \pm 0,21$	$>0,05$	$1,59 \pm 0,23$	$1,27 \pm 0,16$	$>0,05$
UTI	$5,04 \pm 0,56$	$14,53 \pm 0,71$	$<0,001$	$4,03 \pm 0,52$	$14,91 \pm 0,76$	$<0,001$	$4,56 \pm 0,38$	$14,71 \pm 0,52$	$<0,001$
BPH	$7,63 \pm 0,67$			$9,13 \pm 0,77$			$8,34 \pm 0,51$		
<b>Total</b>	<b><math>20,04 \pm 1,02</math></b>	<b><math>21,64 \pm 0,83</math></b>	<b><math>&gt;0,05</math></b>	<b><math>22,15 \pm 1,10</math></b>	<b><math>21,39 \pm 0,88</math></b>	<b><math>&gt;0,05</math></b>	<b><math>21,05 \pm 0,75</math></b>	<b><math>21,52 \pm 0,60</math></b>	<b><math>&gt;0,05</math></b>

The analysis of level of a true case rate of the population of Khorezm region and Republic Karakalpakstan on patients' gender has shown that prevalence of urinary tract infection has appeared higher with women, than those with men. In Khorezm region women's UTI met more often 2,9 times, in Republic Karakalpakstan — 3,7 times that can be explained by anatomico-physiological features of genitourinary organs of women.

In Republic Karakalpakstan, there was above a prevalence of pre-lithiasis indicator with men —  $7,22 \pm 0,69$ , with women it has made  $5,47 \pm 0,49$ .

It is necessary to notice that if at the age of 1–14 the prevalence of urological diseases on 100 surveyed has made  $6,87 \pm 0,62$ , then with persons of 80 years and older their level is made already  $90,91 \pm 6,13$  (tab. 4). Sharp increase of a case rate level was noticed in age group of 60–69 years. If with persons of 50–59 years, case rate level in comparison with age group of 1–14 years is enlarged in 5,6 times, at the age of 60–69 years it was enlarged more than 9 times. In Khorezm region accordingly indicators were enlarged 5,2 and 8,8 times, and in Republic Karakalpakstan — 6,3 and 9,9 times.

Table 4. – Prevalence of urological diseases in the Aral Sea Area depending on age of the surveyed (on 100 surveyed)

Age	Khorezm region	Republic of Karakalpakistan	Totally
1–14	7,52±0,85	6,00±0,89	6,87±0,62
15–19	12,50±1,58	12,54±1,81	12,52±1,19
20–29	19,73±1,40	17,01±1,35	18,40±0,97
30–39	20,11±1,52	20,30±1,55	20,20±1,09
40–49	25,69±1,88	28,63±1,99	27,13±1,37
50–59	39,29±2,66	37,87±2,53	38,55±1,84
60–69	66,02±4,67	59,42±4,18	62,24±3,12
70–79	76,83±4,66	65,33±5,50	71,34±3,61
>80	81,82±11,63	100,00±0,00	90,91±6,13
<b>Total</b>	<b>21,02±0,64</b>	<b>21,69±0,69</b>	<b>21,34±0,47</b>

Presence of salts crystals in urocheras was regarded as a sign of initial urolithiasis stage (pre-lithiasis) which precedes a possible lithogenesis (stone formation) or accompanies this process that proves to be true by researches of K. Sachideu and coworkers. [1989] and others. J. Elliot and coworkers. [1989] consider that the number and the sizes of crystals of newly emitted urine reflect a tendency to a lithogenesis and consider crystalluria as a microurolithiasis. By scientific researches it is proved that in this disease stage the preventive actions are most expedient and efficient, allowing preventing the subsequent processes of stone formation (Rakhmanov D. K., 1999, Tarasenko B. V, 1991, Yuldashov F, 1998, Silva J. A. M. et al. 2002, Tiselius H. G., 2000). Further, in 20–40% of cases if not to carry out preventive maintenance, the crystalluria comes to the end with concrement formation (Baumann J. M. et al. 2003). Thus

the patients with pre-lithiasis and microurolithiasis require special attention, more steadfast, than the patient with ICD.

Pre-lithiasis diagnosed at detection of salts echo-patterns, according to renal ultrasonography and at presence of crystals at the microscopy of urine sediment.

In age groups of 15–19 and 20–29 years, pre-lithiasis level in comparison with age of 1–14 years increased, accordingly, in 4,3 and 5,8 times. Its highest level was observed with patients of 40–49 years (10,40±0,94). At this age the highest indicators of urolithiasis case rate (2,74±0,50) were also observed. Growth of a case rate by urinary tract infections, was observed with age, reaching the peak by 70–79 years (26,11±3,51) (tab. 5). Also turns an attention on itself that with persons of over 70 years old the stones of urinary system organs practically were not observed.

Table 5. – Prevalence of separate urological diseases in the Aral Sea Area in various age groups (on 100 surveyed)

Age (years)	Pre-lithiasis	urolithiasis	UTI
1–14	0,95±0,24	0,12±0,08	5,81±0,57
15–19	4,13±0,71	1,03±0,36	7,35±0,94
20–29	5,48±0,57	1,13±0,27	11,78±0,81
30–39	7,03±0,69	1,98±0,38	11,20±0,85
40–49	10,40±0,94	2,74±0,50	13,99±1,07
50–59	10,10±1,14	2,70±0,61	12,66±1,25
60–69	8,71±1,82	0,71±0,41	16,18±2,37
70–79	4,46±1,65	–	26,11±3,51
>80	9,09±6,13	–	22,73±8,93
<b>Total</b>	<b>5,82±0,27</b>	<b>1,40±0,13</b>	<b>10,75±0,36</b>

At including of outcomes of patients' inspection and treatment in the analysis group were guided by so-called criteria of «standard BPH patient» [Chatelian Ch. et al, 2001]. As the basis the clinical data testifying to presence at patients of benign prostate enlargement and bladder outlet obstruction caused by it has served for this purpose. Patients with bladder outlet obstruction, which was not connected with BPH, the general diseases influencing function

of the bottom urinary tract, as well as earlier operated due to BPH have been excluded from research.

For studying prevalence of BPH, 489 men at the age of 50 years and older have been surveyed, which, depending on age, have been divided into groups — 50–59, 60–69, 70–79 and 80 years and older (Table 6).

Table 6. – Prevalence of BPH signs in the Aral Sea Area (for 100 surveyed)

Age (years)	Number of men surveyed	Prostate volume over 30 ml (%)	Average urine flow rate < 10 ml/sec (%)	Residual urine volume (%)
<b>50–59</b>	263	35,0±2,9	24,3±2,6	7,6±1,6
<b>60–69</b>	129	65,9±4,2	55,8±4,4	28,7±4,0
<b>70–79</b>	83	71,1±5,0	69,9±5,0	49,4±5,5
<b>Over 80</b>	14	85,7±9,4	92,9±6,9	92,9±6,9
<b>Total</b>	<b>489</b>	<b>50,7±2,3</b>	<b>42,3±2,2</b>	<b>22,7±1,9</b>

Volume of a prostate (V) is marked out as a basic sign of its benign hyperplasia. It is considered reliable and objective marker for BPH though its size not always correlates with degree of expression of symptoms of the bottom urinary tract and other signs of disease.

According to the standard data on standard value of volume of a prostate, in our researches we considered its enlarged if the gland volume exceeded 30,0 ml. Prevalence of this sign has made  $50,7 \pm 2,3$ . With the years the prostate volume was enlarged that corresponds to the data specified in the world literature.

The average flow rate of urine was defined by division of volume of emitted urine for the period of urination. In order to obtain the authentic results, it is considered to be that in a bladder not less than 150.0 ml of urine, initially, should contain. Results of the conducted research have shown that almost at half ( $42,3 \pm 2,2$ ) the surveyed men rate of an urination has appeared below 10 ml/sec.

Presence of residual (post-voiding) urine (RU) yet does not allow diagnosing BPH with reliability, but testifies to its pathogenetic influence on the development mechanism of infravesical obstruction. Presence and volume of residual urine was defined right after the urination act. At  $22,7 \pm 1,9$  of the surveyed men the residual urine which volume was enlarged with the years has been detected.

Except the specified widespread urological diseases during epidemiological research, other urological pathology was observed: anomalies of development of genitourinary system, varicocele,

kidneys cysts, stressful urine incontinence, sterility, enuresis etc. As a whole, accompanying, most significant diseases have been observed at 914 inhabitants ( $12,0 \pm 0,4$ ). All of them have received corresponding references for more profound inspection and treatment at the expert in a residence or in specialized clinics.

#### Conclusion

Definition of objective indicators values of prevalence of urological diseases becomes possible at revealing of the latent urological pathology. For the solution of this problem the purposeful epidemiological inspection of the big sample of the population of certain region would be more informative.

Essential value in carrying out of epidemiological inspection has attraction to its performance of a primary link of public health services (general practitioners), as the most approached and having possibility of implementation of early diagnostics of urological diseases. The prime attention thus should be given to obligatory annual preventive medical inspection and ultrasonic research of organs of urinary ways, with the subsequent prophylactic medical examination of urological patients.

Application of specially developed universal questionnaire at epidemiological inspection of the population of Sub-Aral area has allowed defining the indicators of prevalence and improving early diagnostics of the most widespread urological diseases (UTI, urolithiasis, pre-lithiasis and BPH).

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## Epidemiology and clinical manifestations of benign prostatic hyperplasia in the Khorezm region

**Abstract:** Epidemiologic studies are becoming relevant solution for efficient prophylactic tactics in urological disease treatment and prognosis. This paper is an attempt to highlight regional basis epidemiology of benign prostatic hyperplasia (BPH), particularly in Khorezm Region of Central Asia. This study focused preventive measurements of preventive therapy for the early detection of BPH and reduce the incidence of complications. Output of this study concludes that prevalence of symptoms of BPH increases progressively with age.

**Keywords:** Epidemiology, benign prostatic hyperplasia (BPH), urine flow data.

### Introduction

Benign prostatic hyperplasia (BPH) — is one of the most common diseases in elderly men. In spite that during the last 20 years has been conducted many epidemiological and clinical researches all over the world, it is difficult to determine the prevalence of BPH.

Kim, Larson and Andriole determined age-related changes associated with metabolic disturbances, changes in hormone balance, and chronic inflammation may cause BPH development [9, 137–151]. About 8% of men aged 31–40 years have histological signs of BHP, to 6<sup>th</sup> decade this level will increase till 50% and reaches till 90% at 80 years [4, 864–875]. Several studies indicated that period prevalences, incidence rates, waiting time distributions and Lorenz curves were important factors to identify BHP prevalence. For instance, the results of a paper showed that 295,620 men had approximately 3 million dispensing events of the four Nordic countries. The period prevalence was markedly higher in Finland and Sweden than in Denmark and Norway. In 2009, period prevalences were 18.2/1000 males in Finland and 12.0/1000 males in Sweden compared to 6.7/1000 males in Norway and 4.9/1000 males in Denmark [8, 220–227]. An argument by Egan highlighted that cultural, psychosocial, economic, and/or disease awareness and diagnosis factors may influence medical care access, symptom reporting and help-seeking behaviors among men with BPH/LUTS. However, these factors and their epidemiologic association with BPH/LUTS have not been thoroughly investigated [5, 289–297]. Research conducted in different Asian countries showed that age percentage relationship in men with severe and average symptoms of BHP were higher than in American [6, 40–46; 10, 391–395]. Prevalence varies from 18% in men aged 40 years to 56% in men aged 70 years [6, 40–46]. Research conducted in 30 cities of Iran, enveloped 8466 men aged 40 years and older. The overall morbidity rate was 23.8%. The incidence of BPH increases with age, from 1.2% among men 40–49 years to 36% over the age of 70 years [7, 78–81].

An epidemiological survey undertaken by R. B. Nurullayev in Khiva district of Khorezm region in Uzbekistan, showed that wide-

spread of BHP signs among population 50 years and older was: SLUT (IPSS, BS) — 100%,  $Q_{max} < 15$  ml/sec- 60.9%, residual urine- 21.5%,  $V \geq 30.0$  ml-61.9% [2, 36–37].

An epidemiological survey of the population in risk group of certain regions of the Republic of Uzbekistan, showed that the prevalence rate of the disease in the age range 50–59 years was 22.7%, 60–69 years — 63.4%, 70–79 years — 49.7% and at the age of 80 years and older the proportion of patients with BPH reached 63.2%. This prevalence of BPH according to negotiability, in most regions of the country amounted to 7.6%, It was lower than that determined in the course of screening in 57.2 times [3, 7–17].

At the moment modern tactics of treatment of early stages of BPH helps huge amount of patients recover from symptoms of disease through drugs or mini-invasive interventions, cause of that modern diagnostics of disease becoming more actual [1, 33–42].

At the stage of health care reform in Uzbekistan more substantial and indisputable becomes the role of institutions such as rural medical centers (RMC) and territorial polyclinics, as well as professionals (general practitioners) primary care. In this aspect of the definition of actual values of primary health care in the recognition and treatment of urological diseases.

To assess the situation related to the incidence of urinary tract, requires modern information about it, as according to official statistical reports, as well as on the results of epidemiological studies conducted specifically among the population. Lack of completeness and detail of such information at the moment does not allow to present a complete picture of the status of the issue incidence of BPH. Another aspect of the problem is the involvement of primary care (general practice) in the control of urological disease, which is shown, again, as an example only individual disease entities.

The scientific value of the proposed research is to obtain data on the prevalence of BPH and associated diseases, based on population surveys focused on a special method of epidemiological survey. This allows to obtain reliable results of morbidity needed in public health activities, as well as for expert assessment of causal relationships that

determine the prevalence of BPH and associated factors with her. The social value of the work is reflected in the direct influence on disease through the development of preventive measures, medical examination of groups, special monitoring, patient care, prevention of complications and thus improve the quality of life of patients suffering from BPH.

#### The purpose of the study

Epidemiological evaluation of the prevalence of BPH, the development of therapeutic and preventive measures for the early detection of BPH and reduce the incidence of complications in the Khorezm region.

#### Materials and methods

The present study was carried out by employees of the Tashkent Medical Academy (TMA) and doctors of primary health care through local health authorities, in the framework of an integrated epidemiological survey of urological diseases of the population of ecologically unfavorable regions of Khorezm region. For epidemiological survey of the population selected RMC "Avaz Utar" of Yangiariq area and RMC "Uygur" of Yangibazar district of Khorezm region.

Continuous population survey of selected therapeutic areas justified the systematic approach of an integrated and comprehensive study is the most holistic method, which is important in light of the stated purpose of the precinct and the traditional territorial principle of health. For an accurate analysis of the situation is needed examples of deep survey when the specific physician of primary care is responsible for the health of the population.

In the period from February to July 2010, by staff of the Department of Urology TMA and physicians had selected RMC where were 3991 respondents surveyed. From them were selected men 50 years and older, for further examination for signs of BPH.

Department staff of Urology TMA took part in the preparation and planning, as well as in the implementation of research and perform quality control of the latter. Provided standardization of procedures was intended to ensure the quality of consistent implementation of sections of the program to all staff, adherence of continuity as well as the comparability of results.

For a survey of the population used a specially designed at the Republican Specialized Urology Center universal questionnaire designed to identify symptoms of urological diseases. The purpose of the development of the present study was the need for a simple, compact and universal "urological" questionnaire, suitable for both epidemiologic and clinical (general medical and urological) practice in the examination of both genders and all age groups. The questionnaire consists of 33 questions. This includes issues related to the symptoms of the lower urinary tract, urinary tract infections, incontinence, male genital diseases. The information is documented by means of a specially designed survey maps, which were made to

the data of objective examination, the results of the ultrasound scan and analysis of urine using test strips.

To screen for BPH used the following methods: survey of respondents according to special universal questionnaire, including questions of questionnaire of international prostate symptom evaluation system (I-PSS) and quality of life (Bs); physical examination, including a digital rectal prostate examination; ultrasound of the kidneys, urinary tract and prostate with the assessment of the presence and volume of residual urine, determination of prostate volume; determination of the average urinary flow rate; urine analysis using test strips (indication performed microscopy of urine sediment by prescription).

In research used ultrasound scanner "Kransbühler" (Germany) with sensor Convex 3,5 Mhz, operating in real time. As a sound-conducting medium used contact gel brand "Scanogel" and others. For the urine test used Urine-10 test strips of the company "Cypress Diagnostics". If it was necessary, then a microscopy of urine sediment would be tested.

All respondents identified with signs of BPH were included in the group for therapeutic and preventive measures. As a means of conservative therapy used tamsulozin, which belongs to alpha 1-blockers, which by blocking alpha-1-adrenergic receptors hyperplastic prostate, bladder neck and prostatic urethra, "eliminates" a dynamic component of bladder outlet obstruction, thereby greatly reducing the severity of irritative symptoms. At the same time significantly reduced symptoms of the disease and obstructive voiding. Dose was 2 mg per day for 6 months.

#### Results and discussion

Total number of examined were 235 men older than 50 years. From them 126 were men aged 50–59 years (53.6%), 53 were 60–69 years — (22.6%), 50 were 70–79 years — (21.3%), 6 were 80 years and older than (2.6%) patients.

Analysis of the survey results showed that 158 (67.2%) patients showed signs of symptoms of lower urinary tract. At the same time there was a trend of increasing the severity of symptoms in a group of surveyed men with increasing age. According prostate ultrasound in 120 (51.1%) of the men showed an increase in prostate size. Prostate volume increases depending on the age of the 30,0ml to 62ml. Residual urine volume with age and depending on the volume of the prostate naturally increased, on average, from 20 to 160ml.

Urine flow data also showed a corresponding pattern. In increase of age and prostate volume average urinary flow rate decreased from 15.2 to 8.7 ml/sec. In 14.3% of patients it was more than 15 ml/sec, was at 60.0% in the range of 10 to 15 ml/sec, lower than 10 ml/sec — at 25.7%.

BPH is diagnosed in 120 patients, accounting for 51.1% of the surveyed men. They were divided according to age group to followings (Table 1):

Table 1. – The prevalence of BPH in men of different age groups

Age (years)	Yangiariq district			Yangibazar district			In two districts		
	Number of surveyed men	Number of men with BPH	%	Number of surveyed men	Number of men with BPH	%	Number of surveyed men	Number of men with BPH	%
50–59 Years	69	18	26,1	57	25	43,9	126	43	34,1
60–69 Years	20	18	90,0	33	19	57,6	53	37	69,8
70–79 Years	20	13	65,0	30	22	73,3	50	35	70,0
80 Years and older	3	2	66,7	3	3	100,0	6	5	83,3
<b>Total</b>	<b>112</b>	<b>51</b>	<b>45,5</b>	<b>123</b>	<b>69</b>	<b>56,1</b>	<b>235</b>	<b>120</b>	<b>51,1</b>

In 4 men according to ultrasound scan were revealed secondary bladder stones. These patients were sent to the urology department for specialized care.

Most patients had SLUT (65%) perceived their state optimistic and generally satisfactory, considering their age-related and only 35% had a negative attitude to the prospect of having these symptoms in the future. This shows that, even when expressed forms of the disease, some number of the patients neglect or consider this state natural and as a consequence do not go to the doctor.

All men with signs SLUT included in the group of follow-up and preventive treatment. Respondents identified with concomitant diseases (urinary tract infection, kidney stones, hypertension, diabetes and others.) are taken on dispensary registration with the issuance of the related recommendations of the diagnostic, therapeutic and preventive nature.

The effectiveness of therapeutic and preventive measures evaluated as they were completed, the results of re-examination by the same parameters and using the same methods as for the initial examination.

Medication held 104 (86.7%) patients with symptoms of BPH, the remaining 16 (13.3%) for various reasons, refused to receive the drug. For the treatment were used tamsulozin from the group of alpha-adrenergic blockers. The course was 6 months. Already 5–6 days after taking the remedy, patients began to notice a decrease in the severity of the symptoms, especially the urgency and

frequency of urination at night, had also improved the quality of urination. Control survey showed that in patients after initiation of treatment increased urine flow rate, residual urine volume decreased. Analyzing the efficiency of the treatment in general was found that it was successful in 85% of men. These results are consistent with the literature, according to which tamsulozin caused a rapid decrease in the severity of symptoms of BPH to 20–50%, increases urinary flow rate to 20–30% and improves the quality of life of patients [2]. The ineffectiveness of treatment in the remaining 15 (14.4%) patients may be due to the large size of the prostate and the prevalence of obstructive symptoms.

#### Conclusion

Results of an epidemiological study of BPH indicate the need for more in-depth survey of men aged 50 years and older. Prevalence of symptoms of BPH increases progressively with age. Epidemiological study of men at risk in the surveyed region fully complies with the laws of propagation of BPH and its development observed in other countries. Using a simple, mandatory method of diagnosis of BPH in primary health care, making possible the early detection of this disease, which ultimately will avoid various complications.

Use of Tamsulozin during the 6 month, decreases intensity of symptoms of disease, especially imperative urging and rate of nocturia, improving quality of urine (increase of urine flow rate, decrease of residual urine).

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## The effectiveness of ozone therapy in treatment of acute osteomyelitis of jaws in children

**Abstract:** 29 children aged from 7 to 16 years old have involved to investigation and analyses of fatty acids have carried out by gas-fluid chromatography. Markers of endogenic intoxication molecules of average mass (MAM) — MAM254, MAM280, malone dialdehyde (MDA), activity of antioxidant enzyme of catalase (CA), coefficient of MDA/CA and MAM280/MAM254 — coefficient of protein resistance (CPR) have determined in plasma of venous blood. Ozone therapy consisted in performing procedures of the local and general action. It is established that ozone therapy in children with acute osteomyelitis of jaws respectively reduces concentrations of MDA, MAM254, MAM280, proportion of MDA/CA and increases activity of catalase and coefficient of protein resistance (CPR), it is also established a reliably reduction the concentration palmitinic and palmitolenic acids and increase of oleic acid.

**Keywords:** osteomyelitis of jaw, gas-fluid chromatography, endogenic intoxication, fatty acids, ozone therapy.

**Introduction.** In spite of the preventive measures for the last years frequency of inflammation processes of maxillofacial area in children steadily increases, most often rapid progressive types of disease course is observed [1; 5]. Odontogenic infection is become the cause of purulent-inflammatory processes in the soft tissues of maxillofacial area (MFA) in 65–70% of patients. Patients with inflammatory processes of maxillofacial area are from 40 to 60% of all hospitalized patients. From all inflammatory processes of maxillofacial area in children osteomyelitis of jaws is 15–33% [1; 5; 7].

In 65,7–74,3% of patients chronic osteomyelitis of jaws lasts from 6 months to several years and provides prolonged treatment including repeated performing of surgical interventions. Chronic course of the process very often leads to such dangerous complications as chronic generalized sepsis, disseminating of the process to neighboring areas, mediastenitis, deformation of jaws, ankyloses of temporal-mandibular joint and so on [1; 5; 9]. One of the basic causes of failure of mechanisms of specific and unspecific resistance in purulent-inflammatory diseases are oxidative stress characterizing by decompensating of antioxidant activities, accumulation of lipid peroxide products, intensification of free-radical oxidation which lead to the disorders of metabolic processes. Basic areas promoting to the solve of this problem are elaboration and improvement, and also realization in the clinical practice the new more effective methods of diagnostic, treatment and prediction of osteomyelitis of jaws [5; 7; 9].

The most acceptable and widely used in the practical medicine methods and remedies of treatment have unilateral action, causes side effects. In the last years big interest attends to non-pharmacologic methods of general and local treatment, since they do not cause allergic reactions and tolerance. Ozone therapy possessing antihypoxic, antibacterial, immune-corrected, indirect antioxidant, disintoxicated, anti-aggregate and other actions in the last years has widely disseminated in many fields of medicine [2; 7]. From the literary sources it is known that ozone entering into connection with polyunsaturated fatty acids (PUFA) of membranes of erythrocytes is generated peroxides and ozonizes. Besides membrane is

become elastic which gives possibility to the newly generated peroxides on the one hand better entered to the cell, and on the other hand deformability of erythrocytes is improved. Increase ability of erythrocytes to change its forms gives them the possibility to enter into the most hard to reach areas of bloodstream which promotes the improvement of microcirculation [2]. That is why optimization of using ozone in the treatment of osteomyelitis of jaws is become the actual objective.

**The aim** of this investigation was the assessment of the effectiveness of ozone therapy in the complex treatment of acute osteomyelitis of jaws in children.

**Materials and methods of investigation.** 29 children aged from 7 to 16 years old with phlegmons of MFA who were in the hospital treatment in the Department of Maxillofacial Surgery of District Multidisciplinary Medical Center of Samarkand city (head doctor PhD M. K. Azizov) and 15 healthy children (control group) of the same age in the period from 2014 to 2016 have involved to investigation.

Patients were divided into 2 groups: 15 patients getting traditional treatment were included in the 1 group and 14 patients getting in the complex treatment ozone therapy were included in the 2 group.

Gas-chromatographic analyses of fatty acids from blood urea have been carried out by the method described N. K. Mukhammadiev and Sh. M. Ibadova [6]. Markers of endogenic intoxication — molecules of average mass (MAM) — MAM254, MAM280, malone dialdehyde (MDA) and activity of antioxidant enzyme of catalase (CA) have determined in plasma of venous blood. Coefficient of MDA/CA and MAM280/MAM254 — coefficient of protein resistance (CPR) has been calculated [3; 4; 8].

Ozone therapy consisted in performing procedures of the local and general manipulations. Local manipulations were consisted in realization of sequesterectomy before surgical operation, oral-baths with ozonized distilled water barbotaged with concentration of ozone-oxygen gas mixture 4–6 mg/l no more than 3 times per day, washing-out of sinus tract on the skin by ozonized

distilled water barbotaged with concentration of ozone-oxygen gas mixture 2–4 mg/l one time per day and blockades on the peripheral part of inflammation infiltrate by ozonized 0,9% sodium chloride solution barbotaged with concentration of ozone in solution 0,8–1,0 mg/l. After surgical operation oral-baths were carried out by ozonized distilled water barbotaged with low concentration of ozone-oxygen gas mixture (0,5–1 mg/l). General ozone therapy was consisted in performing sequesterectomy before surgical operation, intravenous injection of 100 ml of ozonized 0,9% sodium chloride solution in concentration of ozone-oxygen gas mixture 10 mcg per 1 kilogram of child's body weight in maximal concentration no more than 800 mcg/l gas mixture on the way out of apparatus. After surgi-

cal operation we have carried out intravenous injection of 100 ml of ozonized 0,9% sodium chloride solution in concentration of ozone-oxygen gas mixture 10 mcg per 1 kilogram of child's body weight in maximal concentration 0,6–0,8 mg/l of gas mixture on the way out of apparatus (2–4 procedures). Transfusion speed was 90–110 drops per minute.

Statistic processing of the obtained digital data was carried out with the use of Student criterion on Microsoft Excel 2010 program.

**Results and discussion.** The obtained results according to determination of the parameters of endogenic intoxication and concentration of fatty acids before and after ozone therapy are presented in table 1.

Table 1. – The importance of the indicators of endogenic intoxication and concentration of fatty acids in sick children with osteomyelitis of jaws before and after ozone therapy

Parameters	Measurement unit	Groups			
		Control	Before treatment	After treatment	
				Traditional	Ozone therapy
Parameters of endogenic intoxication					
MDA	mcmol/l	3,50±0,23	9,42± 0,78*	6,87±0,42	5,94±0,24
Catalase	mccat/sec.l	0,90±0,06	0,12± 0,02*	0,44±0,05	0,65±0,05
MAM <sub>254</sub>	SU	0,24±0,03	0,88± 0,05*	0,58±0,03	0,42±0,03
MAM <sub>280</sub>	SU	0,28±0,03	0,79± 0,05*	0,62±0,04	0,46±0,03
CPR	SU	1,16±0,07	0,90±0,06*	1,07±0,06	1,10±0,05
MDA/Catalase	mcmol*sec mccat	3,89±0,16	78,52±3,26*	15,61±0,95	9,14±0,58
Concentration of fatty acids					
C (16:0)	%	28,48±2,02	32,16±2,84	31,66±2,01	31,22±1,96
C (16:1)	%	6,74±0,44	8,93±0,74*	7,98±0,49	7,66±0,42
C (18:0)	%	2,32±0,16	2,65±0,17	2,58±0,13	2,46±0,12
C (18:1)	%	18,63±1,32	15,93±0,78*	16,12±0,82	16,66±0,84
C (18:2)	%	35,64±2,46	33,83±2,11	34,12±2,02	34,58±1,87
C (18:3)	%	0,62±0,04	0,60±0,06	0,61±0,02	0,61±0,03
C (20:4)	%	2,86±0,16	2,16±0,18	2,34±0,14	2,62±0,17
Others	%	2,98±0,12	3,74±0,51*	3,26±0,13	3,58±0,14
Σ USFA		64,49±0,54	61,45±0,82*	61,17±0,66	62,13±0,72

From the data of table 1 it is seen that concentration of secondary products of LP — MDA was decreased by 13,54% with respect to traditional treatment and by 36,94% with respect to indexes during admission to hospital. Activities of catalase was increased by 147,72% with respect to the group with traditional treatment and by 541,66% with respect to indexes during admission to hospital, being closer to parameters of the control group. Proportion of MDA/CA was decreased by 41,44% with respect to the group with traditional treatment and by 88,36% with respect to indexes during admission to hospital. Concentration of MAM<sub>254</sub> was decreased by 27,58% with respect to the group with traditional treatment and in 52,27% with respect to indexes during admission to hospital, and concentration of MAM<sub>280</sub> was decreased by 25,81% and by 41,77% respectively being closer to the normal parameters (P<0,001). Besides coefficient of protein resistance was increased by 102,80% with respect to the group with traditional treatment and by 122,22% with respect to indexes during admission to hospital (P<0,001). Also it is seen that in the blood of sick children concentration of palmitinic (16:0) acid was decreased by 1,39% with respect to the group with traditional treatment and by 2,92%

with respect to indexes during admission to hospital, concentration of palmitolien (16:1) acid was decreased by 4,01% and by 14,22% respectively. At the same time concentration of oleic (18:1) acid was relatively increased by 3,34% with respect to the group with traditional treatment and by 4,58% with respect to indexes during admission to hospital. Also total concentrations of unsaturated fatty acids were increased by 1,57% with respect to the group with traditional treatment and by 1,10% respectively.

The obtained data have been testified that ozone therapy shortens periods of clinical recovery for 2–4 days and promotes to the achievement of positive balance in prooxidant — antioxidant system.

#### Conclusions:

1. Ozone therapy in children with acute osteomyelitis of jaws is respectively decreases concentration of MDA, MAM<sub>254</sub>, MAM<sub>280</sub>, proportion of MDA/CA, and increases activity of catalase and coefficient of protein resistance (CPR).

2. In children with acute osteomyelitis during ozone therapy it has been established a reliable reduction of concentration of palmitinic, palmitolien acids and increasing concentration of oleic acid being closer to the normal parameters.

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## **Factors causing the structure of urinary tract infections in hiv-infected populations in Uzbekistan's Fergana valley**

**Abstract:** The results of clinical and population-based analysis of 507 HIV-infected population with an infection of the urinary tract (HIVUTI). It is proved that the implementation of results of specific epidemiological studies in practice are potentially capable of interrupting the formation of the final “hard points” from HIVUTI: in 80–85% of cases, improving prognosis and determine effective ways to prevent HIVUTI still in preclinical stages.

**Keywords:** urinary tract infections, HIV-infection, HIV-population.

The problem of urinary tract infections (UTI) in HIV-infected people (HIVUTI) in modern urology remains relevant not only because of the frequency of occurrence, but also due to the need to review the pathogenetic mechanisms of the development and optimization of the treatment strategy against the background of specific therapy.

It should be noted that it is not always possible to identify the causative agent of UTI in HIV-infected patients (HIV-population) and assign causal treatment. In these clinical situations of particular importance, along with the so-called empiric therapy of elimination preventive measures against factors causing morbidity UTI, active and urgent prevention HIVUTI [1; 2; 3; 4].

The fact that the development and/or morbidity HIVUTI exert pathogenic effects on the one hand, structural or functional changes/urinary system violation and other -HIV infection and risk factors. Consequently, for the theory and practice of Urology are of interest not only to basic and clinical work on and epidemiological studies on the development of new prevention technologies HIVUTI [5; 6; 7; 8].

However, it is still not subjected to a focused study of factors that may affect the prevalence of UTI at HIV- patients. Practically not used a preventive approach and methods in this regard.

**Materials and methods.** Of the population HIV- lists were issued the passport data of persons aged 20–69 years previously drawn up a contract with the National Centre for AIDS and its departments in the field. The date of the start of the study and the date of its completion → strictly taken into account the rules of sampling to ensure a thorough and active preparatory work was carried out with high response: On the basis of a random representative sample and work with the HIV population was carried out in strict accordance with the pre-defined protocol in the following sequence has been formed HIV- population and personnel screening group: → before the screening test was carried out epidemiological study of a random sample of 50 HIV-positive people → people during training (trial) of the primary study population standardized approaches, methods of treatment worked and inviting representatives of the population in a screening center, the order and the procedure for comprehensive health survey. In the case of sampling errors (wrong information about the presence of HIV in a person who is in the sample, patients younger than 20 years; deaths -Face HIV in the sample prior to the study), these persons were excluded from the calculation of the response. In the absence of the respondent (all cases of refusal to participate in a survey of persons included in the sample, who died during the study period, no cases of the possibility of establishing contact with the respondent during multiple attempts)

its replacement by another person is not allowed. All 507 patients HIV representatives of the indigenous population (503 Uzbek — (99.2%), 2 Tajik — (0.4%) and other nationalities — 2 (0.4%).

At the age of 20–29 years were 197 (38.9%) of HIV, 30–39 years — 235 (46.4%), 40–49–65 (12.8%), 50–59 years — 8 (1,6%) and 60–69–2 (0.4%). The survey was conducted in the screening center using epidemiological (with an estimate of the conventional large FR, FR moderate to low RF), general clinical laboratory (general analysis of blood, urine and feces, study sediment urine), physical, functional and instrumental methods (ECG, anthropometric measurements. Review and excretory urography at the testimony, four cups of urine test). HIVUTI diagnosis (acute pyelonephritis, urethritis, prostate, kidney stones, cystitis) was based on the standards of survey data (frequent and painful urination, aching, or paroxysmal pain above the vagina and/or in the lumbar region, discharge of turbid or bloody urine,

urgency and withhold urine, temperature reaction with chilling), the results of clinical, biochemical, functional and instrumental studies. Statistical processing of the materials carried out on a PC Pentium IV with a standard package of Microsoft EXCEL-2007 applications. We used the methods of multivariate statistical analysis, rank correlation analysis. The significance of differences of the studied parameters was evaluated by t-test (t): invalid —  $P > 0.05$ , low confidence —  $P < 0.05$ , the average —  $P < 0.01$  and high —  $P < 0.001$ .

**Results and discussion.** The results of the comparative assessment of communications HIVUTI with common factors have shown that the most pronounced prevalence Us HIVUTI body mass reduction (BMR) ( $r = -0,54, \chi^2 = 62,4, P < 0.001$ ), and excessive alcohol consumption ( $r = -0,48, \chi^2 = 45,2, P < 0.001$ ).

Table 2 provides a comparative assessment of the HIV Communication and UTI with behavioral risk factors.

Table 1. – Comparative evaluation of the degree of coupling HIVUTI with shared risk factors

General risk factors	value r	$\chi^2$	P
Body mass reduction	0,54	62,4	<0,001
Excessive use of alcohol	0,48	45,2	<0,001
Body weight increase	0,29	38,3	<0,01
Impaired glucose tolerance	0,26	34,5	<0,01
Arterial hypertension	0,22	29,8	<0,05
Dislipoproteinemia	0,18	23,5	<0,05
Microelementoses	0,15	17,7	<0,05
Unhealthy Lifestyle	0,13	8,9	<0,05
Physical inactivity	0,10	3,6	<0,05

Table 2. – Comparative evaluation of communication HIVUTI with behavioral risk factors

Behavioural risk factors	value r <sup>++</sup>	$\chi^2$	P
Consumption of drugs	0,50	49,8	<0,001
Smoking	0,46	44,3	<0,001
Dietary factors	0,28	32,4	<0,05
Infectious agents	0,19	22,5	<0,05
Stress factors	0,12	7,98	<0,05

Table 3. – Comparative assessment of HIVUTI connection with the socio-economic risk factors

Socio-economic risk factors	value r <sup>++</sup>	$\chi^2$	P
Poor living conditions	0,42	40,6	<0,01
Inadequate intake of fruits and vegetables	0,27	33,7	<0,05
Low educational status	0,16	18,4	<0,05
Factor family problems	0,14	7,1	<0,05
Adverse social status	0,11	3,88	<0,05

The findings in this area suggest that the most pronounced HIVUTI connection with the consumption of narcotic means ( $r = -0,50, \chi^2 = 49,8$ ), and 1.1 times less, smoking ( $r = -0,46, \chi^2 = 44,3$ ).

Table 4. – Mathematical model of the cluster of risk factors and progression of UTI in the population, HIV "Socio-epidemiological portrait HIVUTI"

General biological features, socio-economic and epidemiological risk factors associated with the development and progression of IMT in HIV-positive people	The significance of differences in groups according to the criterion + Krus Kal -Walts
1	2
Body mass reduction	P<0,001
Excessive use of alcohol	P<0,001
Consumption of drugs	P<0,001
Multiple factors	P<0,001
Smoking	P<0,001
Impaired glucose tolerance	P<0,01

<i>1</i>	<i>2</i>
Body weight increase	P<0,01
Poor living conditions	P<0,01
Factor family problems	P<0,05
Low educational status	P<0,05
Inadequate intake of fruits and vegetables	P<0,05
Infectious agents	P<0,05
Stress factors	P<0,05
Dietary factors	P<0,05
Microelementoses	P<0,05
Unhealthy Lifestyle	P<0,05
Physical inactivity	P<0,05
Dislipoproteinemia	P<0,05
Arterial hypertension	P<0,05
Gender (women)	P<0,05
Age (20–29 years old)	P<0,05
Monofactory	P<0,05

Direct correlation is also observed with dietary factors (less 1.5 times  $r=-0,28$ ,  $\chi^2=32,4$ ), infectious factors (reduced by 2.2 times,  $r=-0,19$ ,  $\chi^2=22,5$ ) and stress factors (smaller by 6.3 times,  $r=-0,12$ ,  $\chi^2=7,9$ ).

The results of the special statistical analysis (by variance-covariance analysis with important models) indicates (Table 3) that high a correlation exists between HIVUTI and poor housing and living conditions ( $r=-0,45$ ,  $\chi^2=40,6$ ), inadequate intake of fruit and vegetables ( $r=-0,27$ ,  $\chi^2=33,7$ ), low educational status ( $r=-0,16$ ,  $\chi^2=18,4$ ), factor family problems ( $r=-0,14$ ,  $\chi^2=7,1$ ) and unfavorable social status ( $r=-0,11$ ,  $\chi^2=3,8$ ).

In general, it was found that the presence of the general, epidemiological and socio-economic risk factors discussed above notes a progressive increase in the incidence of UTI among HIV-population. These facts, in our opinion, have a scientific and practical and prognostic significance to improve the diagnostic and treatment process and the development of prevention technologies for the prevention HIVUTI among HIV-positive population. We have studied and investigated the contribution of the study of risk factors in the development HIVUTI. The data obtained are shown in Table 4, which shows that a special analysis helped to create a mathematical model of the cluster of risk factors and progression of UTI matched each population, that is, "Socio-epidemiologic portrait HIVUTI" in modern conditions.

The direct dependence HIVUTI of 22 risk factors. The risk of BMI in the HIV-positive population in unfavorable epidemiological situation is most pronounced in the presence of aggressive consumption of drugs, multiple risk factors and smoking; moderately expressed tendency of BMI cluster disadvantaged epiduslovy and availability Impaired glucose tolerance factor, overweight and poor living conditions of life. Slowly UTI matched each formed in the presence of risk factors such as: NPOIF, infections, stress, diet, microelementoses, unhealthy lifestyle, lack of exercise, dislipoproteinemia, hypertension, age and gender, monofactory.

Thus, the factors that structure causing morbidity HIVUTI, the presence of which should anticipate the possibility of urological HIVUTI continuum. Otherwise, any medical diagnostic and preventive technology to a certain extent loses its meaning, that is to our knowledge — 22.7% 100.0% 13.6% — 50% and in 68.2% of cases 25.0%.

**Conclusion** These data and identified epidemiological patterns suggest the need for a comprehensive and simultaneous "impact" approach to the development of prevention and treatment and rehabilitation, taking into account the mutual influence of risk factors in a population of HIV-population, as well as the relationship with the established HIVUTI epidemiologic situation.

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## Factors influencing the choice of hernia repair method in patients with incisional hernias

**Abstract:** The research work is based on analysis of hernia repair results in 228 patients with incisional, recurrent and primary ventral hernias. All operations were performed in the surgical department of the 1st and 2nd SamMI Clinics in period from 2008 to 2016. Patients were divided into two groups: the control group and the main one. Long-term results of surgical treatment of incisional and recurrent hernias were observed in 196 patients in period from 1 to 10 years. From 196 studied patients with long-term observation of outcomes 112 were in the main group, who were assessed by the mark score, and 84 were in the control group. From 84 examined patients of the control group tension hernia repair using autotissues was performed in 36 patients, hernia repair using polypropylene mesh implants in 41 and tension-free mesh repair in 7 patients. The mark score of assessment the perioperative risk criteria in patients with incisional hernias allows you to choose the best way of hernia repair based on individual characteristics of the organism and improve treatment outcomes.

**Keywords:** incisional and recurrent hernias, tension free mesh hernia repair, mark score, program.

**Relevance.** Despite the dynamic development of medical science, the problem of treatment of ventral hernias remains relevant. The increased incidence of ventral hernias is maintained mainly due to incisional hernias, after the laparotomy it is from 10 to 15% according to various data [1; 4; 7]. Results of surgical treatment of incisional hernias are largely dependent on complex issues such as the rational preoperative preparation aimed at the patient's adaptation to increased intraabdominal pressure, the choice of an adequate method of hernia repair and prevention of postoperative complications [3; 6; 7; 9]. In this case the surgeon has a difficult task in determining the indications for use of a particular method of hernia repair taking into account the different risk factors. As a rule, surgeon takes into account the possibility of postoperative complications and the risk of post-operative recurrence of hernia choosing the particular method of hernia repair. To solve the problems every surgeon is guided by its own criteria [2; 5; 8]. Some authors are guided by

clinical data, others — by the data of various instrumental methods of research, others use different algorithms to decide how repair the hernia. Analysis of scientific medical and patent documentation shows that in available literature there is no exact indications for use of a particular method of hernia repair taking into account the different risk factors. The decision of the above-mentioned problems is an urgent and priority issue in modern today herniology.

**Purpose of the research:** To develop a program for quantifying recurrence risk factors in patients with ventral hernias.

**Materials and methods.** The work is based on an analysis of hernia repair results in 228 patients with incisional, recurrent and primary ventral hernias. All the operations were performed in the surgical department of the 1st and 2nd SamMI Clinics date from 2008 to 2016. The patients were divided into two groups: the control group (96–42.1%) and the main group (132–57.9%). Patients in the main group were divided into 3 subgroups (table 1).

Table 1. – Distribution of the main group of patients into subgroups

Gender	Group			Total
	1st	2nd	3d	
Male	13	15	29	57
Female	22	26	27	75
<b>Total</b>	<b>35</b>	<b>41</b>	<b>56</b>	<b>132</b>

Table 2. – Scoring system of indications to the use of different methods of hernia repair

№	Risk factors	Quantitative characteristics	Marks
1	2	3	4
1	Condition of the abdominal wall by ultrasound, CT.	Normal Mild weakness Severe weakness	0 1 2
2	Width of the hernial ring	Up to 5 cm 6–15 cm More than 15 cm	0 1 2

3	Weight (body mass index)	Normal Obesity I-II degree Obesity III-IV degree	0 1 2
4	Age	Up to 40 years old 40-60 years old Older than 60 years old	0 1 2
5	History of hernia	Up to 1 year long From 1 to 3 years Longer than 3 years	0 1 2
6	Physical exertion	Absent Moderate Severe	0 1 2
7	Functional condition of the respiratory system	No disorders Periodic breathing difficulties Chronic respiratory failure	0 1 2
8	Functional condition of the digestive system	No disorders Periodic constipation Persistent constipation	0 1 2
9	Functional condition of the urinary system	No disorders Periodic urination difficulties Constant urination difficulties	0 1 2
10	Severity of adhesive process	No adhesions Adhesions in the hernial sac Abdominal adhesions	0 1 2

In patients of the 1st subgroup with the total number of marks up to 5 (certificate of official registration — the program for electronic computers № DGU 03724) (Table. 2) tension hernia repair using local tissues was performed (Table. 3). This group consisted of patients who, as a rule, had minor defects and observed significant changes in the tissues of the anterior abdominal wall and no comorbidities. In such patients hernia repair by standard methods with the formation of duplicature was performed. In the 2nd subgroup with a score of 6 to 10, taking into account the risk of tissue tension, the various constitutional features that affect the postoperative period, we performed a combined method which is defect of aponeurosis was sutured edge to edge with additional cover of the seams by polypropylene mesh, thereby eliminating the need to overlay the double row stitches. This has allowed to avoid increase of intraabdominal pressure in the early postoperative period and to create optimal conditions for the formation of a strong postoperative scar. In the 3rd subgroup patients with the dialed number of marks from 11 to 20 had a higher risk of tissue tension and increased intraabdominal pressure, in this case it would be advisable to apply only tension free sublay, inlay and onlay techniques, however, we believe that these techniques almost do not reduce the risk of recurrence and do not eliminate the hernia defect. Obviously, the radicalism can be achieved only by eliminating the defect, rather than by its replacement by mesh implants, and therefore the combination of tension and tension free techniques can be considered the best way of hernia repair. A significant factor holding surgeon from radical surgery, is excessive tension during the suture of tissues and a high probability of eruption of stitches in the postoperative period. In such cases, we use combined hernia repair with mobilization of rectus abdominis muscles sheaths by Ramirez. The advantages of the proposed method is that the hernia repair is performed by single-row stitching (which less reduces abdominal cavity), mobilization of rectus abdominis muscles sheaths allows to distribute uniformly

and significantly reduce the pressure on the tissue during the suture. To compare our results 164 patients of the control group who were operated on for incisional and recurrent abdominal wall hernias routinely were taken exclude scoring. We used the same technique as in the main group, at the same time we took into account the width and duration of herniation, patients' age and comorbidities, all other factors, besides the data of CT and MRI, histology and spirometric study (Table 4).

**Results and Discussion.** Long-term results of surgical treatment of incisional and recurrent hernias of the anterior abdominal wall we had been observing in 196 patients in period from 1 to 10 years. From 196 observed patients with investigated long-term outcomes 112 were from the main group in which we used the score, and 84 from the control group. From 84 observed patients of the control group autoplasmic hernia repair was performed in 36, mesh hernia repair in 41 and tension free mesh hernia repair in 7 patients. From the 112 investigated patients, in which hernia repair based on scoring was performed, autoplasmic hernia repair was made in 19, combined mesh hernia repair — in 28, tension free mesh hernia repair — in 34 and tension free mesh hernia repair with mobilization of the rectus abdominis muscles sheaths by Ramirez — in 31. Recurrent disease we identified in 8 patients, which accounted for 4.1% of the total number (209) investigated patients. In the group, we performed hernia repair without scoring, disease recurrence was detected in 7 (8.3%) patients. Where autoplasmic hernia repair was performed in 6 (7.1%), combined hernia repair stitching edge to edge with the additional strengthening of the seam line by polypropylene mesh in 1 (1.2%) patient. In group, where we used scoring, disease recurrence was detected in 1 (0.9%) patient. Recurrence occurred in a patient after hernia repair using autotissues. In patients who had undergone tension free mesh hernia repair relapses have not been observed.

Table 3.– Distribution of patients in the main group depending on gender, age and method of hernia repair

Method of hernia repair	Gender		Age			Total
	m.	w.	Up to 40	40 to 60	Older than 60	
Autoplastic hernia repair	8	17	1	18	6	25
Mesh hernia repair	12	19	1	21	9	31
Tension free mesh hernia repair	23	13	2	32	2	36
Tension free mesh hernia repair with mobilization of rectus muscles sheaths by Ramirez	14	26	9	19	12	40
Total	57	75	13	90	29	132

Table 4. – Distribution of patients in the control group depending on gender, age and method of hernia repair

Method of hernia repair	Gender		Age			Total
	m.	w.	Up to 40	40 to 60	Older than 60	
Autoplastic hernia repair	12	28	5	27	8	40
Mesh hernia repair	18	30	7	26	15	48
Tension free mesh hernia repair	3	5	1	5	2	8
Total	33	63	13	58	25	96

**Conclusions.** Thus, the Mark score criteria of perioperative risk in patients with incisional ventral hernias allows you to choose the optimal method of hernia repair based on individual characteristics of the organism and to improve treatment outcomes.

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## Accompanying defects of development in children with congenital cleft of lip and palate

**Abstract:** For the examination and correction 122 patients with congenital cleft of lip and palate were in the clinic № 2 of SamMI during 2004–2014. In combination of pathology the child was examined by particular specialists. Detected in children with cleft of upper lip and palate external stigma of disembryogenesis — congenital defects of development of extremities, kidneys and other changes of organs have systemic character, progress which is conditioned with dysplasia of connective tissue. For extension of complex aid and provision complete rehabilitation of patients with congenital cleft of lip and palate is necessary synchronic work of specialists.

**Keywords:** children, congenital cleft, defects of development, lip and palate.

**Introduction.** To the most widespread of congenital defects of development refers congenital cleft of upper lip and palate. The birth rate of children with the fact of defect is composed of about 86% anomalies of jaw-facial area and 20–30% defects of development of man [9]. Basically clefts of lip and palate are considered polygenic multifactorial diseases. They may occur as isolated defect of development and was been one of the symptoms of congenital syndromes (syndrome Van-der-Vud, Pier Robin and others). Besides, in majority of sick children with congenital clefts of lip and palate are occurred accompanying congenital defects of development of other organs and system (heart, lungs, kidneys and others), and it is also important to take into consideration in forming plan of treatment. Immediately, after birth of a child with these anomalies of development in maternity hospital is established exact clinic-anatomical diagnosis and determined the plan of surgical and conservative treatment. In case of need child is moved to the surgical department of newborns where is carried out examination, revealed congenital defects of development of other organs and system, diagnosed accompanying somatic and nervous diseases [1; 7; 8]. In the presence of accompanying defects of development, severe somatic diseases, diseases of central nervous system the time of surgical treatment are separated. Surgical rehabilitation must be finished not later 5–6 years with that estimation that the child can go to ordinary school [1; 7]. Children with Daun, Little, children cerebral paralysis and other rough pathology of organism on contraindications may be operated in later estimations [1; 2; 5]. Therefore, in the period new birth is composed of individual plan of preparation of patient to the surgical operation with taking into consideration of gravity of defect of development in the maxillary-facial area accompanying defects and somatic status condition of the child [4; 6; 7].

**Materials and methods.** For the examination and correction 122 patients from them with congenital cleft of lip — 68 (55.74%), palate- 13 (10.66%), one-sided- 96 (88.07%), two-sided- 13 (11.93%) patients, girls- 47 (43.12%) and boys accordingly-62 (56.88%) were in the clinic № 2 of SamMI during 2004–2014. 54 patients from them complete cleft of palate –52 (96.30%), with incomplete- 2 (3.70%), girls-19 (35.19%), boys — 35 (64.81%) were with non closure palate. In primary referencing these children was carried out complete clinic-laboratory examination including clinical, laboratory and instrumental examinations of patients with examination of qualified specialists such as jaw-facial surgeon, INT doctor, geneticist, orthopedist, pediatrician in necessarily neurologist, hematologist and orthopedist-traumatologist. Carried out research was showed that the children with congenital cleft of upper lip and palate accompanying defects of development were registered in the area of head, neck, extremities and trunk and were often combined [3; 5]. The main of them were short frenum of lip and tongue in 76 patients, low index of body weight in 97, deformation of vertebra in 6, club-foot in 19, congenital flat-foot in 5, congenital dysplasia of hip joint in 2, defects of development of urinary system in 19, prenatal encephalopathy in 46, congenital muscular wryneck in 15 children. In the process of research the functions of kidneys were established pyuria in 19 children with congenital cleft of upper lip and palate. These patients were carried out special urological examination in which was revealed congenital stricture of prerenal (8) and pelvic area of urethra (6) was carried out ultrasound examination of urinary system. On evidence of excretion urography in 14 patients were revealed pyelocystitis, in 8 hydronephrotic transformation from the direction of urethra obstruction. Cystic-urethral reflux II degree

as manifestation of congenital dysplasia stoma of urethra was established in 5 children. In combination of pathology the child was examined by particular specialists (neurologist, endocrinologist, cardiologist and others), were carried out suitable recommendations, in the case of need was carried out treatment. The children with accompanying defects of development of extremities and congenital muscular wryneck after training features of nursing and feeding, examination of orthodontist and making of obturator for closing of palate defects during feeding were directed for treatment to the orthopedist-traumatologist before cheilorhinoplasty that is till three-four months of age.

Psychoneurologist carried out medico-pedagogical rehabilitating measures with parents and then with patients about medicament corrective therapy, psychotherapy. All children without exception were examined by neurologist; in the case of need they were taken electroencephalographically examination. Children with encephalopathy got adequate treatment till I stage of operation and further was carried out prophylaxy, observation and the treatment of the specialist [6; 7; 10]. After made diagnosis and type of hereditary transmission (in the presence of the same) by geneticist were prognosticated the degree of birth risk in proband or members of his family of other children with CCL and P. It was carried out by the orthodontist ensuring full feeding of child (obturators, disjunctive plastics and etc.), pre- and post-orthodontic treatment, notice and treatment of secondary deformation of tooth-jaw system, restoration of tooth set. Periods of active observations by doctor-orthodontist are: new born period, before and after operation, changeable bite period, and further systematically observation till complete formation of permanent bite [6; 7; 11]. Logopedist carried out logopedic treatment before and after uranoplastics, training of muscular structure of soft palate, pharynx wall, the development of speech respiration, pre- and post-operative logopedic treatment, development of phonemic hearing, formation of connected speech. Periods of active observation of logopedist are periods in 1–2 years, 4–5 years and further 7–13 years. It has been carried out estimation of somatic status by the pediatrician individually chosen type of feeding and volume of nutrition, evaluated micro flora of oral cavity, immune status, carried out prophylaxy and in the case of need anemic treatment, rickets and hypotrophy, realized preparation for surgical treatment during the first year. These children were actively observed prophylaxy by ENT doctor taking into consideration that the possibility of hit of food from oral cavity to nasal and pharyngonasal cavity may result in to the development of chronic rhinitis, eustachitis, otitis and as consequence to the reduce of hearing. Even in the absence of evident complaints to the function of cardiovascular system, once-only electrocardiographically research in 74 (60.66%) children with congenital cleft of lip and palate was revealed disturbance of automatism function, myocardial, because of which the patients were examined by cardiologist and got preoperative corrections of disturbances. Success of surgical treatment in majority of patients depended on timely conduction of complex preparation in conditions of dispensary observation [7; 12]. Surgical treatment began from 3 months in satisfactory somatic and neurological status. Heading and coordinating the work of doctors-consultants the surgeon-dentist determined data and volume of surgical treatment, controlled timeliness referral children to the consultation of particular specialists and carrying out prophylactic treatment, together with them determined absolute and relative contraindication to the operation. It shouldn't forget in decision of question operation dates and higher responsibility of

pediatrician giving permission to the surgical treatment. His conclusion about contraindication or indication to the operation of a child having accompanying CDD or somatic diseases, the pediatrician confirmed conclusions of particular specialists (cardiologist, nephrologist, urologist, neurologist, pulmonologist, endocrinologist and others). Absolute contraindication to the operation is insufficiency of blood circulation IA and IIB degrees. Relative contraindications are: sharp evident dystrophic changes in myocardium, acute somatic and infectious diseases and not earlier 2 months after recovery hypotrophy I–III degrees, rickets I–III degrees in fastigium period, atopic dermatitis in the stage of recrudescence, anemia with containing of erythrocytes less  $3.5 \times 10^{12}/l$ , hemoglobin less 120g/l, colored finding less 0.75, chronic diseases during 6 months after recrudescence, chronic nephritis with manifestations of renal insufficiency, dermatitis and eczema in the facial area, affection of mucosa. Children with relative contraindications were carried out specific treatment accompanying pathology (in the out-patient or profile departments) and on favorable dynamic was allowed opera-

tive treatment [7; 10]. But in consideration of earlier address to the specialized medical aid from the first days of the life and timely diagnostics of accompanying defects of development, primary cheilorrhinoplasty were carried out at the age of 2–3 months, but qualified surgical treatment of children with congenital cleft of upper lip and palate was finished during 12–16 months of life.

**Conclusions.** Detected in children with cleft of upper lip and palate external stigma of disembryogenesis — congenital defects of development of extremities, kidneys and other changes of organs have systemic character, progress which is conditioned with dysplasia of connective tissue. For extension of complex aid and provision complete rehabilitation of patients with congenital cleft of lip and palate is necessary synchronic work of specialists: geneticist, logopedist, hematologist, otorhinolaryngologist, orthodontist, pediatrician, psychiatrist, orthopedist, surgeon, for timely detection of accompanying defects of development and diseases with the purpose of conduction of full, active preoperative preparation and qualified staged correction of all defects of development.

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## Characteristic features of physical development of newborns born by mothers with pre-eclampsia

**Abstract:** Characteristic features of anthropometric indices of 100 new-borns born by women with pre-eclampsia (PE) according to their postnatal gestation age, in comparison with 30 children born by women without sign of PE and extra genital diseases were described in this work. The conclusion was that among the children born by women with pre-eclampsia (PE) there were immature children (full term and non-full term); their objective evaluation imitates the clinics of hypoxic ischemic encephalopathy and its complications.

**Keywords:** newborns, immature, pre-eclampsia.

Nowadays evaluation matters of monitoring of children's physical development has been of a great practical significance, anthropometric indices proved to be the main indicators of population's health [1; 3; 5].

Investigation of anthropometric indices in newborns taking into consideration their physiological maturation in different mother's pathologies during pregnancy would allow to determine the range of characteristic diseases and make prognosis of their status in the nearest neonatal period of life [4].

**Aim of the Inquiry:** To define the structure of newborns born by mothers with pre-eclampsia (PE) taking into consideration correspondence of body weight (BW) to postnatal gestation age (PGA).

**Materials and Methods of Inquiry.** 97 pregnant women (33–42 weeks of gestation) with different manifestations of PE (main group) have been examined.

PE has been indicated according to the Gooke scale in G.M. Saveleyeva's and co-authors' modification; they have been divided according to the severity of the case: 38,1%, 54,6% and 7,3% ( $p>0,05$ ,  $p<0,01$ ).

30 pregnant women (35–41 weeks of gestation) constituted the control group without PE manifestations and extra-genital diseases before and during pregnancy.

Pregnant women of control and main groups have been statistically comparable according to the age ( $24,2\pm 0,68$  and  $25,2\pm 0,48$  years old,  $p>0,05$ , number of pregnancy — gravid I ( $35,1\pm 4,85\%$  and  $26,7\pm 8,12\%$ ,  $p>0,05$ ), gravid II ( $64,9\pm 4,85$  and  $72,3\pm 8,12$ ,  $p>0,05$ ).

Newborns' status in control group evaluated as 9–8 score in 80%, 7–6 score in 16,7%, 5–4 score in 3,5% according to Apgar's scale, average score constituted  $7,73\pm 0,19$ . Newborns' status in the main group evaluated as 9–8 score in 42%, 7–6 score in 24% ( $p>0,05$ ), 5–4 score in 28% ( $p<0,001$ ) and  $\leq 3$  score in 6% of children ( $p<0,001$ ), on the S' of life average score constituted  $6,54\pm 0,12$  score ( $p<0,001$ ).

PGA in newborns has been established according to 11 somatic and 10 neurologic parameters of J.L. Ballard [3] scale in modification of M.E. Abdullaeva and co-authors (1). In control newborns' group  $PGA \geq 41$  weeks has been revealed in 6, 38–40 weeks — at 23 and at 1 child — 35 weeks. In the main newborns' group  $PGA \geq 41$  weeks has been revealed in 8, 38–40 weeks — at 60, 37–35 weeks at 17, 34–32 weeks at 14 and at 1 child  $\leq 31$  weeks.

Standard investigation of anthropometric indices has been carried out in both newborns' groups (1, 6): body weight (BW), body length (BL), body surface (BS), head and chest circuit (HC, ChC), weight-length index (WLI) and correspondence of HC, ChC (A.F. Tur's index) have been counted.

Material has been analyzed by parametric (Student's t-criteria) and non-parametric methods — Fisher's exact method (FEM) with angled reformation ( $\phi$ ) for relative sizes [4;5] on Microsoft Office XP (Excel 2003) on personal computer «Samsung Sons 830».

**Results and Discussion of the Inquiry.** We stated that the main

anthropometric indices of newborns born by PE-mothers are considerably diminished in comparison with children born by healthy mothers (control group), accordingly: BW ( $2957,7\pm 48,3$ , in comparison with  $3470,3\pm 92,8$  gr,  $p<0,001$ ), BL ( $49,9\pm 0,42$ , in comparison with  $52,8\pm 0,37$  cm,  $p<0,001$ ), HC ( $32,8\pm 0,16$  in comparison with  $35,1\pm 0,23$  cm), ChC ( $32,4\pm 0,18$  in comparison with  $33,9\pm 0,28$  cm,  $p<0,001$ ), but A.F. Tur's index proved to be increased ( $1,045\pm 0,001$  in comparison with  $1,035\pm 0,002$ ,  $p<0,001$ ). We consider A.F. Tur's index (HC, ChC) to be very important for neonatologists; its 1,03 index corresponds to normal beared pregnancy (38–40 weeks); 1,05 index corresponds to unbared pregnancy (37–35 weeks), 1,06 index (34–32 weeks) and 1,07 index ( $\leq 31$  weeks). We stated that in case of retention of physical development of newborns from PGA this index increases in any gestation, but MRP diminishes and, on the contrary, in case of excessive physical development of newborns from PGA this index decreases, but MRP increases. On the base of these methodical data we established the structure of newborns according to the PGA and development (normal, excessive or retarded).

We consider that the study of the structure of newborns born by PE-mothers in correspondence of body weight and PGA will give the possibility to make easier the work of neonatologists on differentiated diagnostics of CNS depressed syndrome in case of hypoxic ischemic encephalopathy (HIE) and clinical picture of physiologically immature full term baby. Difficulties in definite degree can appear in the work of neonatologists in diagnostics of syndrome of hyper-excitability — cramps — in immature full term children; it is considered as a consequences of post-hypoxic status not taking into consideration possible metabolic impairments (hypoglycemia, hypocalcaemia) characteristic to immature babies according to BW and gestation of pregnancy (PGA) which themselves can provoke excessive excitability and convulsive syndrome. Registration of these data in newborns born by PE-mothers will give children's doctors the possibility to understand correctly symptomatic complexes such as HIE, hypertension syndrome, which has been often revealed in practice of local neonatology — 16 and 88 to 1000 children, correspondently in mature and immature children [5], in comparison with foreign researches 1,6–8,0 to 1000 newborns [4].

#### Conclusion

1. At the moment of birth newborns have phenotypic differences varying in BW and PGA which is very significant for their postnatal development.

2. Among newborns born by PE-mothers there were really immature children as well as immature full term babies have been registered.

3. Registration of physiologically maturation newborns born by PE-mothers gives the doctors possibility to identify children's group (immature full term babies and immature) with false clinical neurological signs of hypoxic ischemic encephalopathy (HIE) with its multiple consequences.

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## Correlation of hormonal status indicators of physical and sexual development in children with chronic bronchitis

**Abstract:** The evaluation of physical, sexual development, has been carried out, hormonal status and the relationship between these parameters in patients with chronic bronchitis children have been evaluated. The study included 84 children with chronic bronchitis at the age of 10 to 16 years and 230 practically healthy children matched by age and sex, of them, 37 (35,7%) — girls and 47 (64,3%) -boys. It was found that in children with chronic bronchitis the amount and force of significant correlations changed. Impairment of physical and sexual development in children with chronic bronchitis promotes activation of intraendocrine relations in the absence of significant correlations between the content of the hormones of the studied links of endocrine system, may contribute to more frequent disturbance of physical and sexual development in children with chronic bronchitis.

**Keywords:** chronic bronchitis, physical and sexual development, blood hormones, correlation.

Epidemiological studies carried out in various countries of the world show a steady increase in the number of lower respiratory tract diseases, which have attracted attention due to a high prevalence, disability and mortality [6; 9].

The delay of physical development often leads to difficulties in psychological and social adaptation, the consequences of which can persist even when they reach the normal physical development [1; 3; 7; 8].

Hormonal deviations are significant in the occurrence of various abnormalities in children's health. Chronic somatic diseases play an important role in the formation of the reproductive function of adolescents, there is significant relationship between the state of somatic and reproductive health of adolescents.

Complicated relationship of neurohumoral mechanisms require a comprehensive study of the hormonal profile and its evaluation, taking into account the impact of chronic pathology, including that on the part of broncho pulmonary pathology [2; 7; 9; 10].

Taking into account the above data, the correlation study was carried out aimed at exploring the relationship of indicators of hormonal status, physical and sexual development in children with chronic bronchitis (ChB).

**Purpose of the research.** To identify the features of the relationship between the parameters of physical, sexual development, and hormonal status in children with chronic bronchitis.

**Materials and methods.** A total of 84 (46 obstructive, 38 nonobstructive) children with chronic bronchitis at the age of 10 to 16 years were studied. Of them, 37 (35,7%) — girls and 47 (64,3%) — boys. According to duration of the disease, the patients were distributed as follows: 5–6 years old 32 (38%), 7 years old 14 (16,7%), 8 years old 13 (15,5%), 9 years old 12 (14,3%), 10 years

old and more 13 (15,5%) children. By the degree of severity of the condition, the patients were divided as follows: moderately severe course of the disease was revealed in 48 (51,1%) children, severe — in 46 (48,9%). The control group consisted of practically healthy children (110 boys and 120 girls) of comparable age.

Indicators of physical development were evaluated by the absolute values of length, weight and chest circumference. Body mass index was calculated using the formula  $BMI = \text{weight}/\text{height}^2$  (m<sup>2</sup>). The received data were compared for children's growth and development standards, recommended by WHO (2007). To check the status of sexual development in boys we carried out genetometric analysis and evaluation of the stages of sexual development by J.M. Tanner (1967). When evaluating the sexual development of girls we paid attention to the severity of the pubic and axillary hair distribution, the growth of the mammary glands, for a period of menarche.

In the blood serum of children surveyed, hormone levels are defined by enzyme immunoassay (EIA): TSH (mIU/L), T3 (ng/ml), T4 (mcg/dl), growth hormone (ng/ml), follicle-stimulating hormone (FSH, mIU/ml), luteinizing hormone (LH mIU/ml), testosterone (nmol/l), estradiol (E<sub>2</sub>, pg/ml). Blood sampling was carried out from the cubital vein in the morning on an empty stomach.

To identify the relationship between the analyzed indicators we carried out a correlation analysis using the correlation coefficient *r* and test of its significance using Student's *t* test and Pearson 2.

**Results of the research and their discussion.** Harmonious physical development was determined in 14.3% of patients. Delayed physical development was revealed in 72 patients, accounting for 85,7% of the total number of examined patients, 32 of them (44,4%) — were girls and 40 (55,6%) — were boys. Individual

analysis of anthropometric data showed: 61 (84,7%) patients had a delay of average growth, 69 (95,8%) loss of body weight. In 11 (15,3%) patients aged 15–16 years, body length was above average and significantly ( $P < 0.05$ ) different from the group of healthy peers. In patients of both genders with a delay of physical development a decrease in weight and growth indices occurred, which were in  $-2SD -3SD$  zone. This point to a significant underweight.

Delayed puberty was diagnosed in 68 patients, accounting for 80,9% of the total number of patients examined, 32 of them (47%) — girls and 36 (52,9%) — boys. We found lagging of all genotometric indicators in 26 patients aged 14, 15 and 16 years. Comparative evaluation of the appearance of secondary sexual characteristics showed that in 17 sick boys with chronic bronchitis aged 14, 15 and 16 years secondary sexual characteristics were on the I — II stage of sexual development according to Tanner.

Clinical examination of girls found out that by the age of 16 in 8 (25%) patients with chronic bronchitis mammary glands were at  $Ma_3$  stage and in 24 (75%) did not exceed Tanner II degree. By the age of 16 the sexual body hair was in  $P_2Ax_2$  stage in 26 (81,3%) and in  $P_3Ax_2$  stage was only in 6 (18,7%) sick girls. Steady menstrual cycle had only 5 (15,6%) girls aged 14–16.

When comparing the data of the physical and sexual development of children with severity and duration of chronic bronchitis, we noted a clear link between them. The more severe and prolonged the illness proceeded, the more often the children's physical development was delayed  $r = 0,50$ ;  $r = 0,39$  ( $P < 0.05$ ).

In the study of correlations in a group of healthy boys a high positive correlation was marked between: testosterone and growth ( $r = 0,64$ ), weight ( $r = 0,65$ ) and the degree of pubic hair ( $r = 0,72$ ), genotometric rates ( $r = 0,7$ ). Also strong ( $r > 0,8$ ) correlations between the parameters of physical, sexual development and levels of hormones of the pituitary-thyroid-genital systems were identified. In the group of healthy girls average positive relationship between the level of testosterone ( $r = 0,56$ ), and growth, the weight ( $r = 0,59$ ), pubic hair distribution degree ( $r = 0,51$ ), maturity of mammary glands ( $r = 0,56$ ); between LH and growth ( $r = 0,50$ ), and maturity, of mammary glands ( $r = 0,51$ ); between and FSH and growth ( $r = 0,42$ ), the weight ( $r = 0,51$ ), pubic hair distribution degree ( $r = 0,37$ ), maturity of mammary glands ( $r = 0,46$ ) were marked. GH, TSH and thyroid hormones with indicators of physical and sexual development in girls and boys have a negative correlation. The revealed relationships confirmed the basic physiological processes that occur at puberty. In boys with chronic bronchitis correlations between systems and within them in comparison with the control group were established. So strong positive relations ( $r = 0,6$ ,  $r = 0,74$ ) between the identified parameters of physical development and genotometric indicators were revealed. Mean positive connections were between FSH and growth ( $r = 0,42$ ), body weight ( $r = 0,45$ ) and LH

( $r = 0,34$ ). Between LH and weight ( $r = 0,39$ ), genotometric indications ( $r = 0,37$ ). The average positive relationships between TSH and body weight ( $r = 0,35$ ), between  $T_3$  and body weight ( $r = 0,32$ ), the size of the penis ( $r = 0,33$ ), between  $T_4$  and indicators of physical development ( $r = 0,35$ ,  $r = 0,37$ ), penis size ( $r = 0,37$ ), between testosterone and body weight ( $r = 0,48$ ), growth ( $r = 0,44$ ), testicular size ( $r = 0,47$ ) and FSH ( $r = 0,59$ ) were revealed. Weak positive associations between  $T_4$  and genotometric indications ( $r = 0,27$ ), between FSH and the size of the testicles ( $r = 0,25$ ) were revealed.

As it is known morphogenetic FSH has an effect on the development of the convoluted seminiferous tubules and testicular stroma, which is accompanied by a significant increase in the size of the testicles to the appearance of secondary sexual characteristics [5]. Boys ill with ChB with low genotometric indications most of connections are losing their strength in comparison with the control. New connections develop: the average negative relationships between  $E_2$  and  $T_4$  ( $r = -0,58$ ), TSH ( $r = -0,35$ ). In the group of patients with above-average growth rates average negative correlations with FSH ( $r = -0,44$ ), LH ( $r = -0,46$ ), testosterone ( $r = -0,45$ ), TSH ( $r = -0,49$ ) and genotometric performance ( $r = -0,48$ ) are determined. This group of adolescents with high growth had low levels of FSH, LH, testosterone and genotometric parameters. The revealed relationships of gonadotrophic function of the pituitary and gonads functional state in children with ChB lead to a change in the of relations in the system of negative and positive revers connections.

Girls with ChB also had relationships, both between systems and within them. Less strong ( $r = 0,76$ ), plurality of average ( $r = 0,42$ ) and weak ( $r = 0,28$ ) positive relations between physical, sexual development, and hormones of the pituitary-gonadal system were revealed.

From the above data it can be concluded that in patients with chronic bronchitis the delayed puberty, causes considerable decrease of interference indicators of physical and sexual development and the secretion of hormones of the studied units of endocrine system however, activation of intraendocrine relationships in these groups and the development of new significant correlations were marked.

**Conclusions.** Thus, between indicators of physical, sexual development and levels of hormones of the pituitary-thyroid-genital systems in children with chronic bronchitis during puberty there are certain correlations that allow you to learn more about the pathogenesis of this pathology.

In general, the identified correlations between the studied parameters of physical, sexual development and functional activity of the endocrine system in children with chronic bronchitis at puberty have their characteristics in comparison with the healthy ones. Change of the number, strength and direction of significant correlations may contribute to more frequent impairment violations of physical and sexual development in children with chronic bronchitis.

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## **Assessment of the effectiveness of ultrasound sonography among children with appendicular peritonitis**

**Abstract:** 93 children with diffuse purulent appendicular peritonitis (DPAP) have been evaluated by sonographic indicators. 96% of the patients of the first group with appendicular peritonitis were admitted to the Clinic on 1-4 days from onset of the disease, in the second group all patients were admitted in later days (3-10 days). In the first group, in 4 patients local, in 36 – diffuse and in 5 patients – spilled appendicular peritonitis was diagnosed. In the second group, all patients were diagnosed with DPAP. Application of ultrasound sonography (USS) at DPAP, complicated with intestinal paralysis in children in the preoperative period allows us not only to establish the spread of peritonitis, but also to determine the severity of impairment of the motor-evacuation function of the intestine. USS in dynamic allows timely to identify postoperative intraabdominal complications and choose the best surgical treatment strategy.

**Keywords:** children's appendicular peritonitis, ultrasound sonography, diagnostics.

**Introduction.** Diffuse purulent appendicular peritonitis (DPAP) complicated with intestinal paralysis (IP) is one of the imperative problems in pediatric surgery. Diffuse appendicular peritonitis is the most frequent and severe complication of acute appendicitis in childhood, occurring in 8-10% of all cases, and 4-5 times more often in the first 3 years of childhood than in older age [1; 3]. In recent years, it was managed to reduce mortality among patients hospitalized in the early phases of the disease, however mortality remains very high in advanced forms.

Diagnosis of diffuse purulent appendicular peritonitis (DPAP), complicated with intestinal paralysis (IP), and the correct assessment of its severity before surgery in children are the basis for the further therapeutic tactics selection and prognosis of the disease [5; 10; 11]. To assess spread of pathological process in the abdominal cavity and the severity of intestinal paresis in children, we used ultrasound sonography (USS) of the abdominal cavity in the pre- and postoperative periods [1; 2; 4; 8].

Studies that require the insertion of foreign bodies (e.g. instruments, contrast and radioactive substances) is acceptable only in the preoperative period, when indicated, but they cannot be used in the next few hours and days after the operation, because they themselves can cause serious complications [6]. Phonoenterography and electroenterography, which are commonly used to objective assessment of bowel activity, record of heart sounds and lung rales as well, along with registration of peristaltic bowel noises, [7], which lead to the difficulties of diagnosis. All of them prove that the problem of diagnosis of appendicular peritonitis form and degree of severity of paresis of the intestines in the preoperative period remains actual.

In this context, it is of great scientific and practical interest to use abdominal ultrasound sonography (USS) to assess the spread of pathological process in the abdominal cavity and the degree of

paresis of the intestines in case of peritonitis in children in the pre- and postoperative periods [3; 9].

In the diffuse purulent appendice peritonitis in children the active use of dynamic sonography of the abdominal cavity could allow us to determine the significance of motor-evacuator function of intestine and promotes the early recognition of postoperative intra-abdominal complications. However hereinafter it is needed to carry out investigation directed to elaboration of the new methods intended for prediction the development and prevention of complication (purulent-inflamed and commissural processes) in the abdominal cavity in such disease.

**The aim** of our study was to improve the non-invasive diagnostics, ultrasound study opportunities of ultrasound sonography, complicated with intestinal paralysis, in pre- and postoperative periods among children.

**Materials and methods.** The research is based on the data of USS of 93 children with peritonitis in Clinic № 2 of the Samarkand State Medical Institute. Their age ranged from 2 to 15 years (40 girls, 53 boys). Children's conditions were assessed without prior preparation, in a horizontal position on the back, with ALOKA-5Q0-SSD and SIEMENSE devices: SOWOLIN E S1-50 using linear sensors 3.5; 5.5; and 7.5 MHz, in real time using the dosed compression of the sensor to the abdominal wall, and motor-evacuation activity of the intestine, the spread of inflammation in children with appendicular peritonitis in dynamics were evaluated: the localization and distribution of free fluid in the abdominal cavity, the presence of intestinal peristalsis and its character, intestine diameter, accumulation of fluid and gas in the lumen, the dynamics of promotion of chyme on intestinal tube.

Depending on the results of the primary surgical examination and clinical manifestations of IP as well as a type of treatment carried

out, all the examinees were divided into two groups. The first group included 45 patients with appendicular peritonitis complicated with IP of I-II stage (control group). The second group included 48 of 98 children with DPAP and IP (main group). Both groups were comparable in age, which facilitates comparative analysis.

**Results and discussion.** 96% of the patients of the first group with appendicular peritonitis were admitted to the Clinic on 1-4 days from onset of the disease, in the second group all patients were admitted in later days (3-10 days). In the first group, in 4 patients local, in 36 – diffuse and in 5 patients – spilled appendicular peritonitis was diagnosed. In the second group, all patients were diagnosed with DPAP.

Patients of the first group (45 children, control group), depending on the method used to eliminate enteroparesis, are divided into three subgroups. In the first sub-group of patients (24 patients) during the pre- and postoperative periods gastric contents was aspirated periodically by nasogastric probe and stomach was rinsed using 2% of sodium bicarbonate solution, hypertonic cleansing enema was administered, as well as detoxicating infusion therapy, and potassium deficiency correction. As a result the intestine paresis was resolved.

Children of the second sub-group (11 patients) were additionally administered proserinum to relief intestine.

In the third sub-group (10 patients), it was not possible to eliminate IP using above-mentioned methods, and they were complementarily administered prolonged epidural anesthesia with lidocaine.

48 children with DPAP complicated with IP (second group), when the above-mentioned set of measures to stimulate the motor-evacuation function of the intestine did not give an effect, were additionally administered retrograde decompression of the small intestine through a special probe through ceacostomy or appendicostomy.

Primary USS was carried out in patients 1-12 hours later after admission. Then, in postoperative period dynamics was studied 3-4 times in each patient. The USS results were compared with clinical manifestation, and they confirmed each other.

During the abdominal USS in order to diagnose the extent of inflammation and severity of IP the following sonographic characteristics were evaluated: the presence of fluid in the abdominal cavity and its location; the presence of intestinal motility; diameter and thickness of the intestine; accumulation of fluid and air in the lumen of the intestine; character of chyme advancement by the intestine.

In children with appendicular peritonitis of the first subgroup had following sonographic characteristic. In the right iliac region it was always observed local intestinal paresis: areas with “dumb” bowel loops are visualized, the diameter of which did not change, pneumatosis of the intestinal loops are detected, a small local accumulation of fluid in the lumen of the small intestine in one or two areas, or liquid is not determined. Chyme promotion is slow in the most painful area. In other parts of the abdomen chyme promotion is uniform and normal. Local appendicular peritonitis is echographically characterized by the accumulation of free fluid in the dome of the cecum.

In patients of the second and third sub-group bowel loops were moderately stretched with the predominance of the liquid contents on pneumatization, the movement of chyme was weak, progressive, and peristaltic movements are rare. In diffuse appendicular peritonitis free fluid accumulate in interloopal spaces, right lateral channel, right iliac fossa and pelvic projection.

In the second group of patients (48 children) across the abdominal bowel loops sharply stretched liquid contents were visual-

ized with or without isolated gas bubbles. Peristalsis of intestine was absent, the movement of chyme was weak and pendulum or entirely absent. A significant amount of fluid was in all parts of the abdominal cavity. In DPAP, complicated with IP, free fluid accumulation was visualized in all parts of the abdominal cavity (5 or more parts of the abdominal cavity).

These clinical manifestations and ultrasound findings in patients with DPAP complicated with IP were compared with intraoperative parameters.

In patients of the first-second sub-groups intraoperative was detected the spread of the inflammatory process beyond the cecum, purulent exudate was located between loops of intestine, without going beyond the border of the lower floor of the abdominal cavity. Parietal peritoneum looked dull, edematose. Intestinal loop's diameter was not changed, the pulsation of blood vessels and the intestinal peristalsis were normal.

In examined children of the third sub-group during the operation it was found that the inflammatory process extended to the lower and middle floors of the abdomen, leaving free a subdiaphragmatic space. Effusion in all cases was purulent, often with specific colibacillus odor. The parietal and visceral peritoneum looked edematous, dull, with fibrinous deposits in the region of the ileocecal angle. Intestinal loops were moderately swollen, hyperemic, at the distance of 40-70 cm from the ileocecal angle there were fibrinous deposits. Intestinal motility and pulsation of mesenteric vessels were visually impaired, in the lumen contained plenty of fluids and gases.

The most severe condition among our patients had children of the second group with DPAP complicated with IP. During the operation it was revealed the total impaired visceral and parietal peritoneum, large amount of purulent-fibrinous effusion with specific colibacillus odor. Macroscopically peritoneum looked thickened, infiltrated with massive fibrinous deposits all over. 38.3% of patients had serous petechial hemorrhages on the cover of the small intestine, often with multiple interloopal deposits of pus. Intestinal loops sharply inflated in diameter, filled with intestinal contents - “heavy intestine.” Peristalsis is absent, pulsation intestinal mesenteric vessels sharply weakened, color of intestines was changed and hyperemic with a tone, walls were thickened with fibrinous coating.

Consequently, preoperative clinical symptoms in almost all patients were verified on the basis of intraoperative revision of abdominal cavity. When preoperative indicators of USS with the results of intraoperative abdominal revision were compared, it was revealed that 91.2% of the sonographic findings are consistent with intraoperative data. In remaining 8.8% of the cases hyperdiagnosis was revealed, which was associated with the mastering of the method.

The use of postoperative dynamic USS in all patients with appendicular peritonitis can detect not only the positive clinical picture, but also contributes to early detection of postoperative intra-abdominal complications.

So, in 17 (18.3%) of the 93 patients, various intra-abdominal complications were identified. With USS postoperative complications were diagnosed in 8 patients on 4-7 days, and in the remaining 9 patients on 7-14 days.

Two patients in the postoperative period were diagnosed with the ongoing peritonitis. This complication manifested on 3-4 days after surgery. There was a severe clinical course, the temperature steadily exceeded 39°C, manifestation of toxicity progressed in the form of delirium, sometimes - euphoric state of agitation. There were tachypnoe, severe tachycardia more than 120 beats per minute, pointed facial features, dry lips and skin, reduced turgor. Through probe from stomach was allocated stagnant gastric contents with

bile and the smell of *E. coli*. Indicators of endotoxin remained at high values, intestinal peristalsis was not listenable. Severe or moderate pain around the abdomen was marked on palpation. Muscle tension of anterior abdominal wall was moderate or slight, but there was a pronounced positive Shetkin-Blumberg symptom.

Predominance of the liquid contents on the pneumatization in extended loops of small intestine, a rare peristaltic movement or absence of peristalsis, the presence of edema of the walls, and a small amount of free fluid between the loops were revealed on USS. When such changes are suspected, it is necessary to perform USS of the abdominal cavity in dynamic after the operation on daily basis and in case of absence of positive dynamics recommended to change treatment strategy.

In 12 children abscesses of abdominal cavity (AAC) were found: 3 patients had interloopal abscesses; subhepatic – 3 patients, right iliac region – 4 patients, the lateral channel – 1 patient and intrapelvic - 1 patient. At 3-5 days of postoperative temperature tended to rise, and soon exceeded to 39 ° C, toxemia indicators also rose, appeared local tenderness in the anterior abdominal wall, however, these symptoms were less pronounced than in the ongoing peritonitis.

Echographic sign of intra-abdominal abscesses was the presence of irregular shape with indistinct contours with decreased

echogenicity, often with heterogeneous content. During the dynamic examination ultrasound picture did not change after a meal and stimulation of the intestine.

On 4 patients with formed interloopal, multiple and complicated AAC were performed relaparotomy; on 8 patients with formed intra-abdominal abscesses were performed local minilaparotomy or percutaneous drainage, when abscesses had parietal location.

Signs of early adhesive intestinal obstruction (AIO) were observed in 3 patients. It is very difficult to distinguish paralytic and mechanical ileus. In this case the diagnosis is facilitated by careful examination of all parts of the abdominal cavity by detection of empty areas intestine loops, along with stretched loops. In the early stages of the AIO peristaltic wave of piece of intestine can be seen on USS. Pendulum movement of chyme, as if hitting at obstacle, and rolled back. Also, uneven accumulation of fluid and gas is detected in the lumen of the adducing intestine. Patients with AIO had a repeated surgical intervention.

**Conclusion.** Application of USS at DPAP, complicated with IP in children in the preoperative period allows us not only to establish the spread of peritonitis, but also to determine the severity of impairment of the motor-evacuation function of the intestine. USS in dynamic allows timely identification of postoperative intraabdominal complications and chooses the best surgical treatment strategy.

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## Changes of indices for central hemodynamics during combined epidural anesthesia in children

**Abstract:** The objective is: to increase the efficiency and safety of combined anesthesia techniques with the use epidural anesthesia and propofol during abdominal surgery in children by assessment of hemodynamic and clinical course of anesthesia. Material and methods. The children aged from 3 to 14 years with diseases and of abdominal cavity, were undergone to surgical interventions. To provide anesthesia protection 47% sick children 1 (main) group were used combined EA bupivacaine in combination with propofol, and 53% sick children 2 (control) group were performed combined anesthesia with fentanyl in combination with propofol. The results showed effective analgesia with minimum changes in central hemodynamics. Conclusions. 1. CEA bupivacaine in combination with propofol are characterized by smooth clinical course, prolonged analgesic effect (up to 3.5 hours), early awakening of patient from anesthesia. 2. In condition will CEA with use propofol at main stages of operational period were accompanied with minor, as well as compensate changes of basic indices of the central hemodynamic, that witness on ensuring effective protection of child's body with anesthesia from operating trauma.

**Keywords:** anesthesia, combined epidural anesthesia, bupivacaine, propofol.

**The urgency of problem.** In support homeostasis for patient during anesthesia the states of cardiovascular system, respiratory system and the autonomic nervous system have significant importance. The negative influence of surgical traumas and use anesthetics can be a trigger of various anesthetic and surgical complications for the cardiovascular system [6; 9].

Key position on the issue of tolerance for various stress factors and, in particular, the efficiency of adaptive ability of cardiovascular system take place the problem of vegetative support, state of regulatory mechanisms for sympathetic and parasympathetic systems [1; 4]. In this regard, the study of blood circulation functions and clinical observation of sick children during anesthesia are urgent problems [2; 3; 5; 7; 8].

**The purpose of the study:** Increase the efficiency and safety of combined anesthesia techniques with use epidural anesthesia (EA) and propofol at abdominal surgery in children by assessment of condition for central hemodynamics (CH) and clinical course of anesthesia.

**Material and methods.** The children aged from 3 to 14 years with diseases and malformations of abdominal cavities, being undergone to surgical intervention were examined. For supply anesthetic defence 47% sick children were applied combined EA with bupivacaine in combination with propofol. First (main) group, and, 53% sick children had combined anesthesia with fentanyl and propofol at second (control) groups. The premedication was carried out (i/m.) in composition: atropine (0,1% solution in dose 0,01mg/kg), dimedrole (1,0% solution in dose 0,15 mg/kg), ketamine (5% solution in dose 2,5 mg/kg).

The first group of patients had induction with propofol in dose 3.0 mg/kg and ketamine in dose 2.5 mg/kg. The patients were transferred to areficial ventilation of lungs (AVL) after introduction of muscular relaxant arkurone in dose 0.07 mg/kg. In the second group the patients were performed puncture and catheterization of epi-

dural space at the level Th11–10 with introduction of catheter to the level Th7. The bupivacaine 0.5% solution in dose 1.5 mg/kg was entered in epidural space. The anesthesia was maintained with propofol 7 mg/kg/hour. Momentary epidural bupivacaine was lasted 3.5 hours. To maintain myorelaxation every 60 minutes intravenously arkuron solution 1/2 part of induction dose was injected.

The second group of patients had induction with the similar dose of propofol, fentanyl was in dose 0.006 mg/kg. The patients were transferred to AVL. The anesthesia was maintained with i/m. introduction propofol 7 mg/kg/hour, fentanyl every 15–20 minutes, 1/2 or 1/3 parts of main dose. All patients were taken AVL in the regimen of normo moderate hyperventilation. All patients were performed the following methods of study: clinical observation of anesthesia course with HR monitoring, APs, APd, SpO<sub>2</sub> and state of central hemodynamics was controlled by echocardiography.

**Results and discussion.** We studied the clinical characteristics of the combined methods anesthesia course in children. The clinical course of anesthesia in patients of both groups was characterized by stability of common symptoms. On the main stages of anesthesia the heart rate (HR) index in comparison with the same period of premedication stages, was not significantly changed.

In both groups of patients hemodynamic parameters as arterial pressure systolic (APs) and arterial pressure diastolic (APd) at the anesthesia support period were characterized by tendency to decrease, the normal saturation values will oxygen being determined by pulse oximetry.

In the first group of patients in the most traumatic periods of operation the increase HR on 7.42% and 20.65% in the heart index (HI). By that the index Specific peripheral vascular resistance (SPVR) decreased on 21.19% ( $P < 0.05$ ). Other indices such as Fraction of expulsion (FE) and Average dynamic pressure (ADP) had the tendency to decrease, respectively on 3.88%, 1.92%. Heart beat volume (HBV) had the tendency to increase on 5.61% (Table).

Table 1. – Hemodynamics indices at general anesthesia with propofol in combination with EA (numerator) and total propofol anesthesia in combination with fentanyl (the denominator) in children (n = 40)

Stages of research	FE	HBV	ADP	HR	SPVR	HI
Results	70.89±1.2	23±1.67	76.97±1.58	99.73±2.2	29.62±1.5	2.76±0.1
	70.49±0.85	24.59±1.61	82.65±2.21	97.8±2.21	30.29±1.54	2.87±0.09
Premedica-tion	68.18±1.63	21.43±0.98	86.2±1.23*	113.83±2.68***	29.52±1.39	3.12±0.12
	68.28±1.03	22.9±1.31	90.23±1.79*	107±2.11*	32.16±1.77	3.02±0.11
Intubation	67.3±0.92*	24.13±1.45	93.13±2.89***	126.43±3.4*	25.77±1.33	3.76±0.11***
	66.55±0.96*	26.88±1.63	91.33±1.78*	105.18±1.91*	27.81±1.04**	3.4±0.1***
traumatic stage	68.14±1.04	24.29±1.47	75.49±1.21**	107.13±1.21***	23.37±0.75*	3.33±0.1***
	68.4±0.96	25.56±1.62	77.63±1.39**	100.73±2.13	26.03±0.89*	3.07±0.07**
awakening period	70.64±0.91	24.57±1.48	76.67±1.47	111.41±2.6*	22.57±0.73*	3.49±0.1
	70.9±0.7**	24.45±1.69	76.38±1.49*	96.75±2.27	28.14±0.72	2.75±0.05**

Note: \* The reliability of differences were compared with results ( $P<0.05$ ).

\*\* the Reliability of differences were compared with the previous stage of study ( $P<0.05$ ). \*\*\* The significance of differences were compared with results and previous stages of study ( $P<0.05$ ).

In second group the patients were compared with the results indicating reduction in SPVR 14.06% in the period of anesthesia maintenance. Other indices such as FE and ABP had tendency to decrease, respectively 2.96% and 6.07%, while indices HBV and HR had tendency to increase respectively, 3.94%, 3.0% and 6, 97%.

**Conclusions.** 1. CEA was taken with bupivacaine and was combined with propofol, it was characterized smooth clinical course, prolonged analgesic effect (up to 3.5 hours), early awakening of patient from anesthesia.

2. In condition of CEA with propofol the main course stages at operational period were accompanied by minor, as well as compensate changes of basic indices of CH, that testified on effective protection of child's body with anesthesia at abdominal surgical interventions.

3. CEA on the base of propofol use was the method of choice to protect children in abdominal surgery.

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## Evaluate the effect of copper-bearing iud on women's reproductive health

**Abstract:** Contraception using modern copper-bearing Intrauterine device (IUD) in the last twenty years, and remains the most acceptable method of birth control population. The main factors influencing the choice of this method are: the fear of repeat abortions, psychological and non-acceptability of the negative attitude to hormonal contraception, affordable cost, ease of use.

**Keywords:** The copper-containing, IUD, contraceptives.

Despite the widespread promotion and dissemination of oral contraceptive, in the minds of many women, the IUD is the most affordable, cheap, reliable and convenient method of protection from unwanted pregnancy. High efficiency, accessibility for all social groups, the lack of systemic effects on the body, the possibility of a long and continuous use, rapid recovery of fertility after removal tools, no need to explain the choice of the daily control of the majority of women in favor of this method of contraception [1–5].

Analysis of domestic and foreign literature has shown a high interest of researchers in various aspects of intrauterine contraception. However, so far in the literature there are conflicting opinions about the use of the IUD, which indicates unsettled sight medical community on contraception in general.

**The objective** assessment of the impact of copper-bearing IUD on women's reproductive health.

**Material and methods.** The study involved 72 women who were established copper-containing IUD, the main group and 30 women in healthy women without IUDs — a control group.

During the investigation of cases of pregnancy have been reported. This is consistent with numerous studies, we meet againment of high contraceptive effectiveness of copper-containing IUD today [3; 4].

All of the women surveyed were aged 22 to 47 years old. The average age of women was  $36,2 \pm 1,3$  years.

**The results and discussion.** In the study of menstrual function revealed that 95 (93.7%) of patients in both groups menarche occurred in a timely manner. The average length of the menstrual cycle in all women was  $27,1 \pm 1,3$  days. Elongated menstrual cycle (days 31–35) was noted in 2 (6.7%) control group of women and 6 (8.3%) — a second group truncated (23–27 days) — 3 (10.0%) and 7 (9.7%) women, respectively. The duration of menstrual bleeding vibrational-las 3 to 7 days, with a mean of  $5.2 \pm 1.1$  days.

Between menstrualnys spotting occurred in 1 (3.3%) women in the control group. Abundant menstruation observed in 1 (3.3%) patients and 13 controls (15.7%) patients of the main group. However, it should be noted that a third of these women used IUDs are not more than a year. In this respect, we adhere to the view that such changes in menstrual function often are reversible and do not require additional treatment [5].

According to the results of the research that the majority of patients in both groups (93.9%) indicators hemoglobin levels were within the normal range, we can not agree with the opinion about the development of iron-deficiency anemia due to increased volume and duration of menstruation on a background of copper-containing IUD [1].

In analyzing the medical history of all patients found in 39 (54.2%) women were extragenital diseases. Among all the diseases accounted for the largest share of diseases of the digestive organs. At the time of the study did not reveal a single case of acute exacerbations of chronic extragenital diseases. In 2 (6.7%) women in the control group and 12 (16.7%) — main group had a history of surgery.

For patients was characterized by a high incidence of gynecological diseases transferred. It is noteworthy that 5 (16.7%) in the control group and in 20 (40.3%) of the main groups have a history of chronic inflammation of the pelvic organs, and a core group of women with this pathology significantly more. Patients repeatedly treated for inflammation of the genitals in outpatient and inpatient settings.

In order to determine the position of the IUD in the uterus, gynecological pathology detection performed ultrasound new pelvis.

All women in the intrauterine cavity of the uterus located correctly. In 93.9% of the women, there were no pathological changes.

Uterus was defined as the formation echo dense pozadi bladder with a longitudinal size of 4.7 to 7.1 (average of  $5.1 \pm 0.2$  cm), a transverse dimension between 4.0 and 5.7 (mean  $4.3 \pm 0,2$  cm) and anterior-posterior size from 3.8 to 5.9 (on the average  $4,8 \pm 0,3$  cm). Endometrial thickness averaged  $0,54 \pm 0,06$  cm. Appendages field study in two women in the control group were found signs salpingoophoritis. Symptoms of adhesions occurred in 3 women of the main group.

Breast examination, which included ultrasound and mammography, showed the presence of fibrocystic breast in women in the control group 1 and five — the main, all these cases were previously confirmed diagnosis before the IUD is inserted.

Analysis of the generative function of women showed that one patient had an average of 4.4 pregnancies ( $4,7 \pm 0,5$  in — the first,  $4,2 \pm 0,4$  — in the second group). The average number of births fall into one patient (the ratio of the number of births to the number of women giving birth), it was about the same and amounted to 1.6 in the first group and the second — 1.7. Srav-tional analysis of the reproductive behavior of women indicated that abortion prevailed in the outcomes of pregnancies. The ratio of the number of abortions among genera was 2: 1 in the first group and 1.6: 1 — for the second.

The number of abortions, the woman comes from one of the first group was  $1,3 \pm 0,04$ , the second group —  $2,8 \pm 0,3$ . The share of the first group of women who have had three or more induced abortions, almost half the preview decreases the figure in the second group. It was found that almost every third woman in the control group and one in four — the main group had a history of abortion up to birth.

To date, some researchers argue that the IUD is a leading factor in the etiology of inflammatory diseases of the pelvic organs [3]. We hold a different view. There are factors that affect the likelihood of the development of inflammatory diseases of the pelvic organs (pelvic inflammatory disease), such as the woman's age, number of sexual partners, the number of abortions, the presence of a history of genital inflammatory diseases, etc. The occurrence of PID in IUD users, according to our data, often due to a lack of screening and treatment prior to use IUD or wrong selection of candidates for this type of contraception, or the lack of follow-up during the use of the IUD.

Recent large multicenter study showed that the risk of pelvic inflammatory disease on the background of the IUD does not differ from that show-telja in the population and is 1.6–2.2%. Compared with women not using contraception IC, in applying the IUD has several high probability of PID in the first 20 days after IUD insertion.

Until now, no single point of view on the possibility of long-term use of copper-containing IUDs. Some experts believe that these contraceptives are already enough reasons to increase the previously approved five-year term of their service. For less than the IUD is changed to the new, the less the risk of pelvic inflammation, perforation and other complications observed, mainly, soon after the introduction of contraceptives. Furthermore, as a result patients contraception costs become much cheaper and more accessible [2].

Some interest in terms of the risk of inflammatory diseases is age of onset of sexual activity surveyed women-communities, which was significantly lower in the group of women with pelvic inflammatory disease and condition, pitchfork  $18,5 \pm 0,3$  years vs.  $19,4 \pm 0,3$  — healthy.

It is now established that the main risk of inflammatory diseases of the pelvic organs in the background ICH associated with infections, sexually transmitted infections. In our study, significant differences were found between groups in the average number

of sexual partners ( $1,3 \pm 0,3$  and  $1,9 \pm 0,1$ , respectively, in groups). Until the middle of women who had more than 4 sexual partners, the first group is 4 times greater than in the second. Having multiple sexual partners increases the likelihood of sexually transmitted infections, and hence the inflammatory diseases of the pelvic organs, including women with IUD.

The risk of inflammatory diseases of the pelvic organs in women using IUD and not having infectious asymptomatic sexually transmit-

ted infections, similar to the risk in women who do not use this method of contraception. Intrauterine contraception while respecting its use of technology has no negative influence on fertility of women, allowing them to use the IUD after bear pregnancy. Among the women who wished to conceive after the timely extraction of the IUD, 55.6% — have become pregnant within six months, the rest in those year. does not exceed the average in performance The frequency of complications of pregnancy and childbirth.

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## Section 9. Regional studies and socio-economic geography

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### Demographic bases of formation of labour resources in Uzbekistan

**Abstract:** This article describes the formation of the labour resources of labor force the population under working-age, the working-age population the population above working-age, migration, as well as changes in the dynamics and territorial structure of the labor resources.

**Keywords:** human resources, demographics factors, migration, dynamics and territorial structure of the labor resources.

Demographic situation and labour resources formed in the republic hold an important place in the development of national economy of Uzbekistan. Therefore, it is significantly important to effectively use labour resources in the process of settling economical-social issues. Effective use of population and labour resources, perfection of employment of the population is today's one of the most actual problems and most problems of everyday life are precisely connected with it. Therefore, investigating it helps to settle positively the geodemographic situation which is being formed.

Indices such as the number of population, its dynamics, reconstruction peculiarities, balance of migration, regional location and density of the population, labour resources and their formation peculiarities, employment of the population play an important role in regional location and development of economical branches throughout countries and regions. Recently although economy of the Republic has gradually been growing, getting developed, provision of the population with work, especially the youth just joining labour resources has become one of the most important tasks.

Alongside with provision of economical-social development the reforms carried out in the country also serve to enhance the employment of the population. The first President of the Republic of Uzbekistan said the following words about it: "High development and growth of economics and service sphere have been the most important direction for us — provision of employment of the population, first of all, created good necessary conditions to provide graduates of professional colleges and high schools with employment. In 2015, over 980 thousand extra vacancies were organized, and over 60 percent of this were created in villages" [1].

Changes in age and sex of the population influence working population densely connected with each other, and through this they influence the formation of labour resources, and the formation of labour resources produces peculiar effect on social-economical development of the countries and regions [2, 68–69].

When the age of the population is analyzed from the view-point of the formation of labour resources, one puts into three groups and learns taking into account living period and general peculiarities of the population:

1. The population under working-age (children and teenagers up to 0–16);
2. The working-age population (men of 16–59 and women of 16–54);

3. The population above working-age (men of and over 60, women of and over 55).

In the republic, as to the status of 1 January 2016, children and teenagers under 16, that is, the number of population under working-age reached 9469,2 thousand people. 48,4 percent of them are females. As it is being observed the number of this group is increasing, however, its share in total population is gradually decreasing. In 2000, its share reached 39,7 percent, and in 2015 it reached 30,0 percent. If we reckon the continuation of this process, even in the close future the republic will stably be provided with labour resources.

The major part of the total population consists of working-age population. Its number is 19257,0 thousand people (48,2 percent of it makes females), its share makes 61,0 percent. The dynamics of the working-age population shows that in recent years its validity is increasing like its amount performances. For example, in 2000 the share of the population of this age was equal to 53,0 percent and in 2015 this performance reached 61,0 percent (See pic 1).

The population over working age made 2849,1 thousand people (9,0 percent). According to the analyses, the number and share of the population of this significantly grew in observing period. Particularly, in 2000 its share was equal to 7,3 percent, and today it excelled 9,0 percent. In the analysis of sex composition of this group one can observe that females make 65,5 percent of all the group members. Such a significance is not recorded between the two above-stated group members. Due to the extension of average lifetime and increase of elderly people on its base, the number of elderly people exceeds the number of working-age people in the future.

Very many factors have direct and indirect influence on reconstruction of the population and labour resources. Economical, social, demographic factors have separate place among them. Among the factors having direct influence, demographic factor holds a special place. This factor influences the process of reconstruction of the population through population dynamics, coefficient of natural increase, existing differences in the age and sex composition.

Although natural increase has become stable in the Republic in recent years, absolute number of the population labour resources is enlarging. If the population increases with 500–550 people on average in a year, 300–350 thousand people are joining labour resources [4, 59].

Migratory movement of the population of the Republic has had negative balance in recent years. For example, within years 2011–



2015, 937,0 thousand people left the Republic, and 746,1 thousand people moved in and consequently migration balance has ended in negative 190,9 thousand people. Only in 2015, the number of emigrants (168,6 thousand people) exceeded the number of immigrants (139,3 thousand people). Obviously, the number of people leaving the country is still more than the number of people moving in.

Therefore it is necessary to emphasize that negative numbers of migration is decreasing. For example, the balance of negative migration of 2010 (-43,8 thousand people) reduced to (-29,3 thousand people) 14,5 thousand people in 2015. On the assumption of this, one may conclude that the negative balance of regional movement of the population of the republic has been diminishing in recent years.

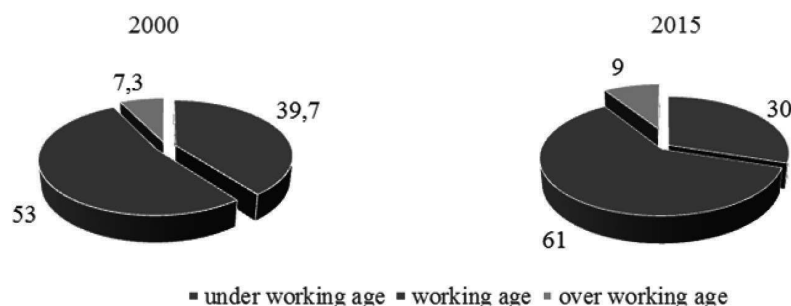


Figure 1. The distribution of the population for its groups of main ages

Labour resources — the essential manpower of the society and the most important component of social production. The number of labour resources, growth dynamics, qualification preparation and location peculiarities, have a significant influence on specialization of production in the scope of region and districts, organization and development.

Uzbekistan is one of the countries whose number of labour resources growing rapidly. In accordance with the number of labour

resources Uzbekistan holds the third place among CIS countries after Russia and Ukrainian [3, 101].

The number of labour resources in our country is rapidly growing under the influence of demographic factors. In 2000, the number of labour resources of the republic was equal to 12718,0 thousand people, in 2015 it made 18276,1 people. Within the observed period (2000–2015 years) the number of labour resources reached 5558,1 thousand people or increased in 143,7 percent (See pic 2).

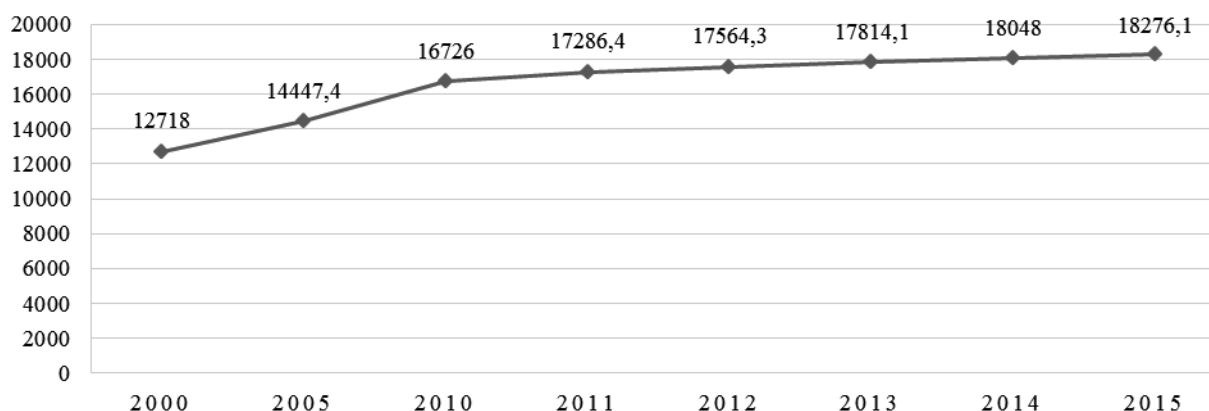


Figure 2. Dynamics of labour resources of the Republic of Uzbekistan (on account of thousand people)

53,4 percent of labour resources of Uzbekistan falls on urban population aggregate and the rest 46,6 percent falls on rural population aggregate. Here, it is necessary to emphasize that the share of labour resources of rural population aggregate relatively increased during 2010–2015 years. For example, in 2010 it was equal to 45,4 percent, and in 2015 this index reached 46,6 percent. On the contrary, due to the slow natural increase of the population in cities the share of labour resources went down and in recent five years it went down from 54,6 percent to 53,4 [5, 23].

The labour resources in the republic are located differently depending on the number of population. They are densely located in intensively developed Fergana, Tashkent, Samarkand regions, but in less developed Mirzachul, Navoiy, Karakalpakstan, Surkhondaryo they are scattered.

Samarkand region is in the leading place for its most labour resources among other regions. In 2015 the number of labour resources in the region exceeded 2033,6 thousand people. According to the number of labour resources, Jizzah, Navoiy and Sirdaryo regions cannot reach Samarkand region even if they are counted together (See pic 3).

According to the number of labour resources, Fergana region is in the second place throughout the republic. This region has 1996,5 thousand labour resources. The number of labour resources of Fergana region is two times as much as the one of Bukhara or Khoresm.

Besides, according to the number of labour resources, Andiyan, Kashkadaryo and Tashkent regions are characteristic. From 1609,6 thousand of people to 1725,7 thousand of people fall on each of these regions.

Among the regions of the republic, Syrdaryo (464,0 thousand), Navoiy (540,3 thousand) and Jizzah (734,7 thousand) regions are relatively less provided with labour resources.

During the years of independence rich mineral resources were found in areas such as Usturt, Kizilkum and they have been fast developed. Unfortunately, such places lack of labour resources. Therefore, it is necessary to organize migration of labour resources in densely populated areas. In the result of it, the country is normally provided with labour resources, and also the mineral resources will widely be developed, the infrastructural system will be more developed. The migration of labour resources will have a good influence on economic-social development of the country.

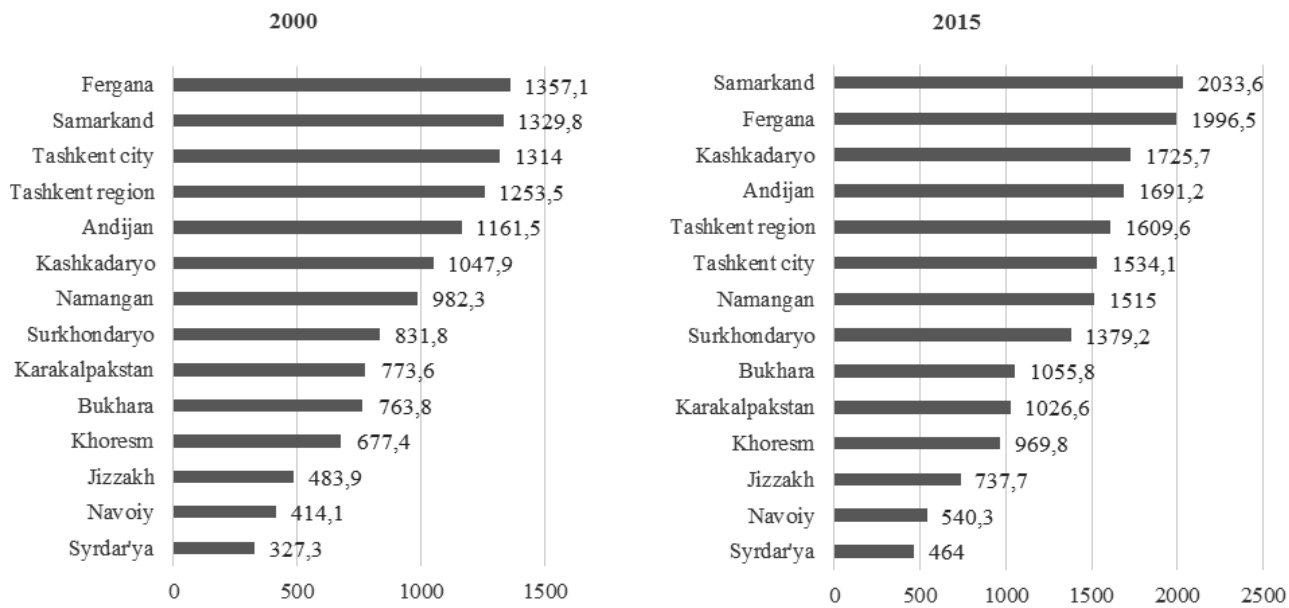


Figure 3. Regional composition of labour resources (on account of thousand people)

Thus, one may come to the following conclusion about the formation of labour resources and regional composition:

- due to the stability of natural growth of the population the share of the population under working age will decrease, on the contrary, the share of the working-age population and population above working age will increase;
- labour resources are growing rapidly due to the influence of demographic factors, within 2000–2015 they increased in 1,5 times;
- although today the bigger part of labour resources falls on

urban population aggregate, the share of labour resources of village population aggregate increases due to its faster natural growth;

- the main part of labour resources is located in intensively developed areas. Therefore it is desirable to organize manpower migration in areas with inconvenient natural condition but rich of natural resources;
- organization of manpower migration in areas lacking labour resources will have a positive influence on the economic-social development of the country.

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## Section 10. Sociology

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### Peculiarities of youth developing in the conditions of forming of civil society

**Abstract:** In this article some aspects of the social activity of youth and social policy on creating conditions for social activity of youth in the Republic of Uzbekistan are considered.

**Keywords:** youth, person, social activity, political activity, social policy, new conditions, civil society, market economy.

The harmonious development of young people is a priority of the state policy in Uzbekistan. For this reason, the development and formation of civil society organizations working with young people in the country paid much attention. Uzbekistan has created a large number of community groups of citizens, many of whom have their own regional and local offices, have a set of rights and duties, allowing them to actively participate in the reform of society. Taking into account the human rights issues of importance, the solution of which is not only the state, but also in society as a whole, a task focus and efforts of non-governmental organizations on this issue, to focus their activities on the implementation of a permanent public monitoring of the observance of the rights of people by state authorities and officials of any rank.

One of them is “Kamolot” [1]. As a public organization formed in 2001 and consists of five million young people between 14 and thirty years. The “Kamolot” has the Republican Children’s Organization “Kamalok” [2] numbering in its ranks more than three million members from 10 to 14 years. Also there are Public funds “Bolalar” [3], “Sog’lom avlod uchun” [4] which activity are aimed to charity and work in the area of youth policy. All political parties are open youth sector, working with the young electorate, and the Fund “Mahalla” [5].

The “Mahalla” Fund is engaged in charity work in the communities, that is, citizens’ self-governing agencies. It should be noted that the history of the mahallas begins its existence with the city of Samarkand. Mahalla is a quarter of the city area where citizens live. Since Uzbekistan is a densely populated country, the majority of citizens are young people, especially the teenagers part.

It should be noted that Mahalla because it incorporated the principles of democratic local self-government is an important historical value requiring an extremely careful attitude. Any ill-considered experiments with social institution like mahalla may lead to irreparable mistakes. On the basis of the mahalla, its original structure can successfully develop new principles of local self-government is more practical and transparent business management, most goodwill towards people, eradication of various manifestations of bureaucracy etc.

Mahalla as a government agency in regions can be the basis of a healthy civil society, and thus the foundation of a strong and

democratic state. It is worth noting that there are different from the above point of view on the role of mahalla institute in modern society. Mahalla in its structure is the cradle of youth morality. It is place of customs and identity of the people.

It should be noted that today in Uzbekistan there is an understanding that the particular individuals, specific people depend entirely on goal orientation, dynamism and effectiveness of the reform processes. From what is this person in the short term, how spiritual, cultural and moral values, it will be committed, and success depends on our reforms, the future of our country. The challenge is to create a state-legal mechanism that would reliably guarantee equal starting opportunities for all people of disclosure and the realization of their ability to meet their needs.

“A democratic society is primarily a civil society. High sense of true democracy is a harmonization of interpersonal, inter-ethnic, national, social and political relations, when a man and society, society and the government live in peace and harmony”.

Civil society is a society of conscious individuals who are actively involved in solving social and political problems, where the rule of law, eliminating arbitrariness and interference of the state where the citizens and the state act on the basis of partnership. Although the Constitution of the Republic of Uzbekistan and no definition of civil society, it secured the legal basis of creating and activities of civil society institutions, the principles of their interaction with the state.

Public bodies are increasingly developing and extending their cooperation both with NGOs and other civil society institutions. Almost every public body created its own system and mechanisms of cooperation with NGOs in the field of human rights.

Today we can state certain stagnation in the national revival parties. It is obvious that a serious activity of all political parties should be working with young people. I would like to focus exactly on the middle age group of young people (18–24 years) is a kind of “transitional age” from youth to the state of “young adults”. In general, young people can be divided into two broad categories — students and “working youth”. Of course, for each of these groups is characterized by its electoral style, their political imagination, but what you need to work with them, it is a fact. Youth is a “society in the

society”, and as an adult environment — it is very heterogeneous. For example, so-called “working youth” is different and a high degree of absenteeism, and support for the existing system. Due to its mass medium — special education (mostly technical), it works, and make them interested in politics is extremely difficult. A small group of the politically active part of the pro-governmental youth structures (as a rule, lower levels), is a small indigenous representation in the party organizations, which can be explained in principle.

Politically active students can be divided into “systematic”, trying to use the proximity to power, as a kind of “social lift” and “off-systematic”, as a rule, adhere to the moral and material interest, pragmatism and boyish.

It should be noted that young men and women in Uzbekistan took an active part in the large-scale reforms aimed at further deepening democratic reforms and formation of civil society in the country. The active participation of young people in the parliamentary elections and the presidential elections in the Republic of Uzbekistan testifies to the growth of its social activity and the strengthening of citizenship.

Participation in the election of representatives of the young generation is important in the formation of the country’s democratic state and free civil society. During the projects “Youth is ready for elections”, “Your voice matters,” “Today — the student, tomorrow — the voter” further enrich our knowledge about the changes in the national election legislation, preparation and conduct of elections. Today, like all peers, young people voted for a worthy candidate.

Representatives of the “Kamolot” in the Lower house of Parliament are 17 deputies. It speaks of the active citizenship of activists of the youth organization.

Modern political, socio-economic and cultural-ideological changes taking place in Uzbekistan provide an opportunity for every citizen to be a full-fledged subject of state-legal relations, actively participate in the formation and development of a legal democratic society. In this context the importance of acquiring the degree of development of civic activity of the person, which forms its moral and legal behavior.

Morality consists in the knowledge and acceptance of the values of the individual as a person with rights, freedoms. Formation of a full-fledged citizenship should be provided by society, family, social environment and reality surrounding the person. An important place in the process of its formation takes educational institutions. Speaking of civil legal education, in the context of the formation of citizenship, modern sociologists, pedagogues and psychologists refer to the following:

- teaching and educational activity;
- social and moral education;
- practical activity aimed at the implementation of social projects.

It is important to understand that civil-legal education as a separate area of educational work requires a holistic and integrated approach to achieving its goals and objectives. This approach primarily entails:

- emphasis in the process of education, attention to solving major social problems, aiming to unite in moral and patriotic identity;
- formation on the level of personal understanding of the values and ideals of citizenship, social solidarity and responsibility;
- ensuring the integrity of the individual personal development and self-determination of its collectivist.

An integrated approach should take into account the public task of patriotic education of citizens of our society, the specifics of the

region and the overall educational environment, as well as the interests, life orientation and abilities of students.

It is important to understand that the educational environment of high school not only affects the subject of the educational process, translating the value priorities, but also demonstrates the importance of each individual in the university system of values. Student involvement in the educational environment of the university through its awareness of the environment, provides interactivity and positive psychological effect, under which students respond to these challenges, offering personal-significant decision

The foregoing leads to the conclusion that the formation of civic stand modern students is a complex, multifaceted activities, the most important role in the educational system which executes. Adolescence, characterized by an active formation of attitudes and values, views and interests is the period during which the establishment and development of a sustainable civil position will be the most intense and effective [6].

We would like to refer to the Constitution of the Republic of Uzbekistan. The Constitution provides follows:

- public citizens’ associations (trade unions, political parties, other associations of citizens) must be registered in the manner prescribed by law;
- impossible creation and activity of political parties and other public associations, infringe on the constitutional order, sovereignty, integrity and security of the republic, constitutional rights and freedoms of its citizens, advocating war, social, national, racial and religious hatred, the health and morality of the people, as well as paramilitary organizations and political parties based on ethnic and religious grounds, secret societies and associations;
- public association shall have equal legal possibilities for participating in public life, the State shall ensure the observance of their rights and legitimate interests;
- state bodies and officers shall not interfere in the activities of public associations, and the latter does not interfere with the activity of state bodies and officials;
- political parties are obliged to submit to the Oliy Majlis or the authorized agency public reports on their financial sources;
- state does not interfere in the activities of religious organizations;
- dissolution, prohibition or restriction of the activities of public associations may take place only on the basis of a court decision;
- mass media are free and act in accordance with the law, censorship is not allowed;
- the order of elections, the organization of work and powers of self-government bodies shall be regulated by law.

The above-mentioned constitutional principles of civil society institutions received their specification in the law “On public associations”, “On the non-state non-profit organizations”, “On public funds”, “On Political Parties”, “On the financing of political parties”, “On citizens’ self-government bodies”, “On trade unions”, “On mass media”, “On professional activity of journalists”, “On freedom of conscience and religious organizations” and others.

Civil society as an intermediate association, which is neither a state nor a family (in the broadest sense of the word), ie civil society including voluntary associations, companies and other corporate entities.

The concept has been used with different meanings by many authors since the XVIII century, but the above which used today is the definition belongs to G. Hegel [7].

The youth is generation of people undergoing maturation stage, ie identity formation, acquisition of knowledge, social values and norms necessary to place as a full and a full member of society. For

proper understanding of youth as a social group should focus not on demographic criteria and socio-psychological referred to as a period of life between 14 and 30 years — between childhood and adulthood [8].

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## Section 11. Agricultural sciences

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### Substantiation of the order of the calculations and specifications crop irrigation Currently

**Abstract:** The article presents the demonstration calculations to refine the methods of crop irrigation regimes adaptation. FAO international methodology on materials perennial local research showed them that opportunity, that is, transition to a single for irrigated areas all over the world.

**Keywords:** Landscape, agrolandscape, irrigation norms, the growing season, the way of irrigation, fluid and electrolyte balance, FAO, CROPWAT, soil.

In Uzbekistan, there are 4.27 million hectares of irrigated areas, and are currently in the design of irrigation systems for their timely and in the right amount of irrigation and watering clarification about the documents used alone, and in the operation of irrigation systems in the basin administrations of irrigation systems — Other documents [1; 2; 3].

Applicable regulations are based on field studies conducted 30–40 years ago. To date, mineralization of irrigation water increased by 2–3 times, changed the soil and hydrogeological conditions, the earth underwent artificial drainage, and they have different fertility [4]. There are a number of recommendations for the calculation of the order of irrigation of agricultural crops [5; 6; 7 et al.]. However, these recommendations do not fully take into account the above changes.

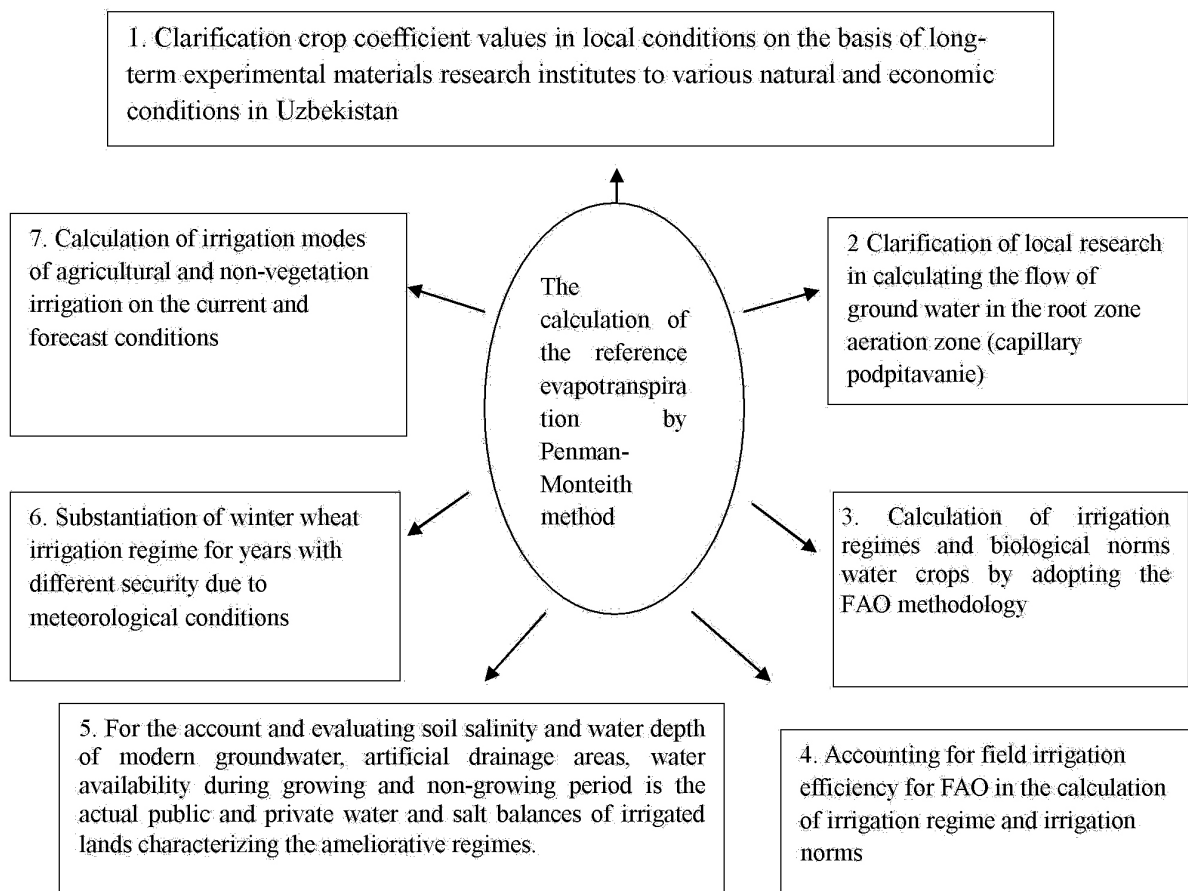


Figure 1. The general sequence of order of priority irrigation of agricultural crops and rationale specifications water needs

Therefore, this article put forward recommendations for the transition to a single method of FAO for the irrigated areas of the world, as well as in the Republic it is necessary to make appropriate adjustments Change, and on the subject based on the results of years of research and developed recommendations.

The general sequence of the order of priority irrigation of agricultural crops and justification specifications need for water is shown in Figure № 1.

When approaching the order of irrigation for crops FAO methodology, data weather station is widely used, is located close to the object, on the calculation formula Penman-montain.

Under the standard of the water needs of crops (UTB) means “water flow size used for evapotranspiration, allowing disease-free growing on a large field to the plant, without limitation, using fertility and soil moisture to reach the full potential for fertility.”

$$ET_0 = \frac{0.408\Delta(R_n - G) + \gamma \frac{900}{T + 273} u_2 (e_s - e_a)}{\Delta + \gamma(1 + 0.34u_2)}$$

Here:  $ET_0$  — standard evapotranspiration [mm day<sup>-1</sup>],  $R_n$  — net radiation on the upper surface [MJ m<sup>-2</sup> day<sup>-1</sup>],  $G$  — intensity soil heat flux [MJ m<sup>-2</sup> day<sup>-1</sup>],  $T$  — the average air temperature at a height of 2 m [°C],  $u_2$  — wind speed at a height of 2 m [m<sup>-1</sup>],  $e_s$  — saturation vapor pressure [kPa],  $e_a$  — actual vapor pressure [kPa] ( $e_s - e_a$ ) — vapor pressure deficit of the air [kPa],  $\Delta$  — pressure curve slope pair [kPa °C<sup>-1</sup>],  $\gamma$  — psychrometric constant [kPa °C<sup>-1</sup>]

Temperature, humidity, duration of wind and sunlight in areas where no observations were made on the balance of Radiation calculated according to the information [9]. Evapotranspiration crop flow is designed according to the following formula:

$$ET_c = K_c \cdot ET_0 \quad (2)$$

here:  $K_c$  — coefficient accounting water consumption sowing.

Based on many years of experience ISMITI (formerly SANII-RI) PSUEAITI (formerly UzPITI), Research Institute of grain and leguminous crops on irrigated land, and other research institutions, in view of ripening, resistant to salinity and drought varieties, refined AR for the calculation of the water consumption of local crops.

Table 1. – The coefficients of the phases of development of agricultural plants, calculated on the FAO methodology

autumnal wheat						
Indicators	groundwater level, m	The phases of development of crops				
		1	2	3	4	
		19.11–20.01	21.01–26.02	27.02–30.04	1.05–20.06	
1	2	3	4	5	6	
Kc по ФАО		0,35	0,75	1,15	0,20	
Kc 2004–2005 y. y.	1,5	0,40	0,72	1,19	0,49	
Kc 2006–2007 y. y.		0,64	0,73	1,24	0,35	
Kc. average		0,46	0,73	1,20	0,42	
Kc 2004–2005 y. y.	2	0,38	0,68	1,19	0,49	
Kc 2006–2007 y. y.		0,62	0,73	1,23	0,34	
Kc average		0,50	0,71	1,21	0,42	
Kc 2004–2005 y. y.	2,5	0,37	0,68	1,19	0,49	
Kc 2006–2007 y. y.		0,62	0,73	1,23	0,34	
Kc. average		0,49	0,71	1,21	0,41	
Kc 2004–2005 y. y.	3	0,37	0,68	1,19	0,49	
Kc 2006–2007 y. y.		0,62	0,73	1,23	0,34	
Kc. average		0,49	0,71	1,21	0,41	
Corn						
Indicators	groundwater level, m	The phases of development of crops				
		1	2	3	4	
		2.07–11.07	12.07–13.08	14.08–02.09	03.09–30.09	
Kc ФАО		0,4	0,8	1,15	1,10	
Kc 2005-y.	1,5	0,67	0,91	0,96	0,9	
Kc 2005-y.	2	0,61	0,73	0,94	0,89	
Kc 2005-y.	2,5	0,59	0,71	0,91	0,82	
Kc 2005-y.	3	0,56	0,69	0,91	0,81	
Cotton						
Indicators	groundwater level, m	The phases of development of crops				
		1	2	3	4	
		14.05–31.05	1.06–21.07	22.07–30.08	1.09–30.09	
Kc by ФАО		0,4	0,75	1,15	0,7	
Kc 2006-y.	1,5	0,38	0,71	1,16	0,91	
Kc 2006-y.	2	0,32	0,62	1,05	0,68	
Kc 2006-y.	2,5	0,29	0,59	1,02	0,63	
Kc 2006-y.	3	0,28	0,57	1,01	0,63	

1	2	3	4	5	6
peas					
Indicators	groundwater level, m	The phases of development of crops			
		1	2	3	4
		17.11.05–1.03.06	2.03.06–24.04.06	25.04.06–17.05.06.	
Кс by ФАО		0,3	0,7	1,0	
Кс 2005–2006 y. y.	1,5	0,47	0,66	0,90	
Кс 2005–2006 y. y.	2	0,42	0,63	0,87	
Кс 2005–2006 y. y.	2,5	0,39	0,63	0,84	
Кс 2005–2006 y. y.	3	0,38	0,63	0,83	

Note: Кс-achieved indicators in lysimeters during field studies (for the main agricultural crops and repeated)

To determine the size of the capillary humidified groundwater root soil analyzed local lysimeter studies (Katz D. M., Kiseleva S. P., Rahimboev F. M., Amanov H. A., Krilov M. M., Bepalov N. F., Ry-zhov S. N., Ikramov R. K. et al.). The FAO manual studied the em-

pirical relationship between the. level of groundwater with different mechanical structure, located below the root layer of capillary mois-ture and speed up, and taken three typical profiles (easy, medium and hard) soil ground (2 table).

Table 2. – FAO listed in the manual approximation equation empirical relationship between the level of groundwater with different mechanical structure, located below the root layer of capillary moisture and speed up

Name of soil profiles	Empirical equations of approximating	Correlation coefficient
1 енгила	$G = 6.1264 e^{-0.043H}$	$R^2 = 0,9899$
2 ўрта	$G = 16,675e^{-0,028H}$	$R^2 = 0,9218$
3 оғир	$G = 18,348e^{-0,042H}$	$R^2 = 0,9145$

For their practical use at the Institute of Soil Sciences zoning maps for the profiles of three typical soils selected from kartagramm «soil quality assessment» will be developed, designed for the active layer of 2 m above the aeration zone.

The procedure for watering crops and standards requirements in a biological water will be identified by the following equation:

$$B = W_e - W_b - P - G_e + ET_c \quad (3)$$

Here:  $W_e$  — spare soil moisture at the end of the month, mm;  $W_b$  — soil moisture reserve in the beginning of the month, mm;  $P_e$  — precipitation, mm;  $G_e$  — Receipt of underground water, mm/Coon

In determining irrigation norms during vegetatsii in the root layer can increase the need for water for flushing the second salinity.

The rate required for one irrigation is revealed by the following formula:

$$d = (p \cdot S_a) \cdot D / E_a \quad (4)$$

Here: p — The share of the available soil moisture; Sa- available soil moisture, mm; D — The depth of the root system, m; Ea — ir-rigation efficiency;

The formula determining the time between waterings:

$$i = (p \cdot Sa) \cdot D \quad (5)$$

Construction of field irrigation schedule for each type of plant is calculated by months, the water balance is calculated by the following formula: (root layer?)

$$W_e = W_b + G_e + P_e - ET_c \quad (6)$$

In determining the order and irrigation standards specified in the manual FAO efficiency for cotton adopted as 0.65. In our condi-tions in the fields of literature, the efficiency is given as 0.55 ÷ 0.75. As IMIS can be taken as 0.669 ÷ 0.729 [10; 11]. When watering the crops and the use of water saving technologies (laser land leveling, irrigation furrow to furrow film pulling or mulching with straw, in-stead of the main ditch the use of portable chutes et al., Which can raise the efficiency of up to 0.95.

Currently, necessary comprehensively examine the depth of groundwater, soil salinity and mineralization of water provided for ir-rigation, the total drainage of land, irrigated regimes expressing general

and special water-salt balance and harmonize the relationship of order and irrigation norms “vegetatsionny” and “nevegetatsionny” period. This is done using a method developed in ISMITI [12].

To substantiate the aeration zone of irrigated land and the best water-salt balance of the upper layer of groundwater can use a com-puter program «WASTER»:

$$\frac{\partial w}{\partial t} = \frac{\partial}{\partial x} \left[ K(W) \frac{\partial H}{\partial x} \right] - e(w, x), \quad (7)$$

$$V = -K(W) \frac{\partial H}{\partial x} \quad (8)$$

$$\frac{\partial(wc)}{\partial t} = \frac{\partial}{\partial x} \left( D \cdot \frac{\partial c}{\partial x} \right) - \frac{\partial(vc)}{\partial x}, \quad (9)$$

Here:

H — generalized potential soil moisture, m;

$$H = P(w) - x \quad (10)$$

P (W) — capillary potential (pressure) m; x — the vertical coordinate (x = 0 on the surface of the soil, a positive direction down), m; W — volumetric moisture, m<sup>3</sup>/m<sup>3</sup>; By (W) — hydraulic conductivity coefficient; e (w, x) — function selection of moisture by plant roots; V — moisture transfer speed, m/day; C — the salt concentration in the pore solution, g/l; D \* — factor of convective diffusion of salts; t — time, day.

With the help of the above differential mathematical models can calculate the drainage of land (the value to be confirmed by the calculation of the total and private water and salt balance), and to determine crop irrigation schedule.

The above FAO manual method of determining the washing of salts based on the leaching of salts from the soil like a “piston”, which gives extremely high standards of salt leaching. However, in our region, water shortage is difficult to achieve. Therefore, accord-ing to the recommendations ISMITI advisable to define standards “novegetation” watering.

For the accumulation of moisture glaze made in the second half of February and beginning of March, in conditions not salty and a little salty automorphic soils (groundwater level below 3 m) up to



2000 m<sup>3</sup>/ha of water. On hydromorphic lands (groundwater level 1,5 ÷ 2 m) and with a shallow layer of soil (0,5 ÷ 1 m) should not sand and pebble artificial soil moisture accumulation ratios exceed 1000 ÷ 1500 m<sup>3</sup>/ha. In our conditions, to determine the salt leaching standards V. R. Volobuev expedient to use the formula.

$$N = 10000 \cdot h \cdot \lg(S_n / S_d)^a \quad (11)$$

Here: N — leaching rates, m<sup>3</sup>/ha; h = capacity of the washed soil-ground layer, m; S<sub>n</sub> — salt content in the layer is washed prior to washing (% of dry weight soil-ground); S<sub>d</sub> — allowable salt content (% dry weight of soil-ground); a — salting rate determined according to experimental industrial washings. Significance soleotdachi depends on water-physical properties of soils and their changes for a variety of loam within the following limits:

- For light mechanical composition depending on the composition of salt — 0.62 (chloride — Cl = 40–60%) — 0.82 (sodium sulfate);
- For the loamy soils of the inhomogeneous structure corresponds α = 0.92 (chloride type of salinity) — 1.12 (sodium sulfate-type);
- For clay or loam with low salting α = 1.22 (chloride type of salinity) — 1.42 (sodium sulfate), etc.

The formula for the calculation of V. R. Volobuev less salting land reduces the rate of salt leaching, thus it is advisable to salt leaching standards equate to the above regulations moisture accumulation.

In our conditions, the main method of combating soil salinity is to build on fields year-round washing mode.

$$K_p = \frac{O_p + N + O_c}{ET_c} = 1,1 \div 1,2 \quad (12)$$

CP is the coefficient of leaching regime of irrigation land is based on many years of advanced materials, on the recommendation should be K<sub>p</sub> = 1.1–1.2.

In justifying modes and agricultural irrigation standards must take into account a variety of weather conditions and crop technology. To account for the changing weather conditions by way of watering crops as the main option, you must take the totality of precipitation in vegetation period. Calculation of one-time and seasonal irrigation standards for FAO methodology and program SROPWAT to evaluate the efficiency of water use in irrigation systems, water saving in the current and future level of development, water use criteria with a decrease in water supply, determine the exact water needs and water management features.

To determine the norms washing salinity V. R. Volobuev expedient to use the formula. In view of the above, the calculation of one-off and seasonal irrigation standards the same for all irrigated areas of FAO method and program CROPWAT should be used in the Republic of Uzbekistan respectively, adapting and making adjustments.

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## Land meliorative status in irrigated lands of Syrdarya province

**Abstract:** Article describes the assessment results of land meliorative status in new improved complex approach in districts of Syrdarya province. Research was mostly conducted in the districts. Moreover, the recommendations for improvement of each district is presented.

**Keywords:** vegetation period, groundwater mineralization, soil salinization, irrigated lands, cadastre, land meliorative status, water supply, wells, closed horizontal drainage.

### Introduction

In the region, initial studies on meliorative zoning conducted by V. N. Legostaev and B. S. Konkovin 1961 year. The research proposed a methodology that developed for designing meliorative activities. At that time there was less experience on different types of drainage to against land salinization and was not been using the methods of justification of meliorative activities based on water-salt balance.

A great contribution to the development of methods of engineer-meliorative zoning was done in the 1960s by A. A. Rachinskiy, who summarized the theoretical basis for the study of meliorative zoning based on water-salt balance that required for any meliorative project. However, these studies on meliorative zoning were aimed on meliorative projects of development of new agricultural lands.

Currently indicators of land melioration status cannot be separated from water supply, drainage and technical condition of hydromeliorative systems.

Maintenance of drainage network in operating condition — the basic requirement to ensure a drainage on lands where applicable horizontal drainage, and also in co-operation of this kind of drainage with others. An analysis of the technical condition of drainage network of Syrdarya province farms has shown that as the drainage's technical condition deteriorates, the area of medium — and strongly saline lands and lands with unacceptably high levels of ground water increase, which ultimately affects the productivity of crops.

The presidential decree of the Republic of Uzbekistan of April 29, 2012 “About measures for further improvement of irrigated land and the efficient use of water resources”, as well as the state program for development of the water sector for the period 2013–2017, require a deeper study, planning and implementation measures to improve meliorative condition of irrigated lands, as well as improving the scientific methodological basis of scientific studies, which leads to the relevance of the topic.

The literature on water balance calculations in the melioration, there is mainly addressed issues of drawing up balances in a season, a year, or for long time. In the present time when water and other natural resources are limited, it is necessary to a conduct more detailed researches on the regulation of water-salt balance of irrigated lands with time series, such as a month. This is necessary in the operation of hydromeliorative systems and in preparation of projects for improving the integration of natural and economic conditions of the object and establishing the optimum technical and economic parameters of hydromeliorative systems.

In modern practice, actual and forecasted water-salt balance are compiled for one or several territories, or for administrative areas. Due to the fact that the impact of drainage areas include roads, canals, settlements, the overall water balance necessary to be on the gross area of meliorated circuit. This allows to take into account the hydraulic relationship “big” and “small” drainage systems, to more accurately predict the depth of groundwater table and the load on drainage.

The purpose of this research is to carry out meliorative zoning of Syrdarya province, which allows to properly orient in planning of strategies of melioration work and the proof of their effectiveness.

Meliorative zoning for the first time carried out on existing hydromeliorative system, basing on the analysis of actual melioration regimes and recommended settings on the forward-looking terms, based on general and particular water-salt balance.

### Study area

The area of research is located in the South Central part of the Open Steppe. According to the administrative division, the research

area relates to Sardoba, Havat, Mirzabad Bayaut, Gulistan, Sayhun, Syrdarya and Akaltyn District of Syrdarya province.

The total area Syrdarya province of 427600 hectares, where 298800 hectares is irrigated land. The main crops of the land are cotton (37% of the area) and wheat (30% of the area), with gross harvest of 250344 tons of cotton and 356318 tons of grain (in 2011).

### Materials and methods

There has been developed the principles and methodology for meliorative zoning. There has been developed parameters for meliorative regimes for different hydrogeological-soil-meliorative and economic conditions, taking into account the use of resources of collector-drainage waters for irrigation. Achieved meliorative zoning of Syrdarya province on the complexity of melioration and drainage module with the appropriate parameters of recommended meliorative regimes. Additionally, there is refined methods of technical and economic comparison of different types of drainage, zoning map developed by type and size of drainage.

### Results and discussion

During the vegetation period of 2011, groundwater depth are divided differently. Saykhunobod, Gulistan and Boyovut districts 1.5–2 m (45–85%), and 2–3 meters (7–51%) were in depth. Areas of Oq oltin, Sardoba, Havas, Mirzaabad and Syrdarya districts were 2–3 meters (62–92%) in depth (Figure 2).

When we analyze the distribution of groundwater mineralization areas, Saykhunobod, Syrdarya, Gulistan districts were 1–3 g/l (50–83%), Boyavut, Oqoltin, Havas, Mirzaabad districts were 3–5 g/l (55–80%), Sardoba district were 5–10 g/l (62%) (Figure 3)

At the end of the vegetation period in 2011, the soil salinity distribution in almost all districts were low saline (77–96%) and high saline (1–20%), and in Mirzabad district almost 50% of the land were medium salined (Figure 4).

Meliorative status of Bayaut, Sardoba, Oqoltin, Mirzaobod, Havas districts of Syrdarya provinces were very low (0–1,1%), poor areas were 8–23%.

Assessment of water supply for irrigated land during the vegetation period following formula were used [1].

$$B_3^{BIT} \eta_c + B_{KDC} < K_B^{BIT} [O_p]^{CB} \psi^{CB} \quad (1)$$

Where:  $B_3^{BIT}$  — water sampling during the vegetation period  $m^3/ha$ ;  $\eta_c$  — Coefficient of irrigation systems;  $K_B^{BIT}$  — A decrease in the average irrigation rate, in this case, the maximum yield of agricultural crops will decline by at least 10% in this case. According to “Guidebook”,  $K_3^{BIT}$  — growing to an average of 0.80, while SANIIRI of the Academy of Sciences the end of the recycling that coefficient is 0.83;  $[O_p]^{CB}$  — Irrigation water mineralization of 1 g/l, which is a significant case for the structure of agricultural real average rate  $m^3/ha$ ;  $\psi^{CB}$  — the status of land reclamation and irrigation account of increase in irrigation water was achieved a significant increase in the extent of the corrective coefficient average indicator.

$$[O_p]^{CB} = \frac{O_p^1 f_1 + O_p^2 f_2 + O_p^3 f_3 + \dots + O_p^n f_n}{\sum_{i=1}^n f_i}, m^3/ha \quad (2)$$

Here:  $O_p^1, O_p^2, O_p^3, \dots$  — corresponding to the areas of gidromodul clear standards for agricultural irrigation,  $m^3/ha$ ;  $f_1, f_2, f_3$  separate fields for crops, ha.

In case of water resources shortage and propensity to land salinization, the water availability of non-vegetation period should be calculated for (from November until April).

$$B_3^{MB} \eta + B_{KDB} < K_B^{MB} [B]_{MB}^{CC} \psi^{CC} \quad (3)$$

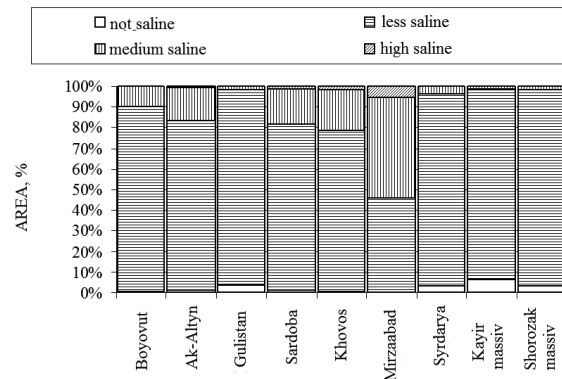
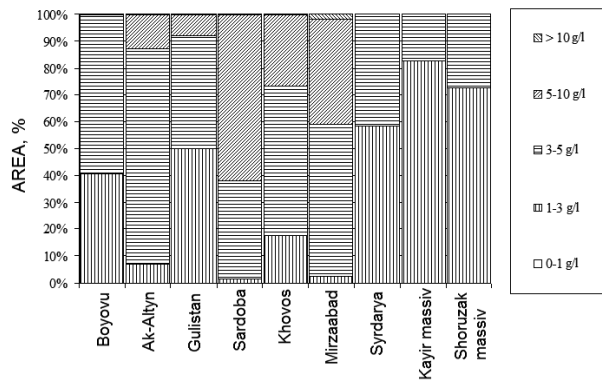
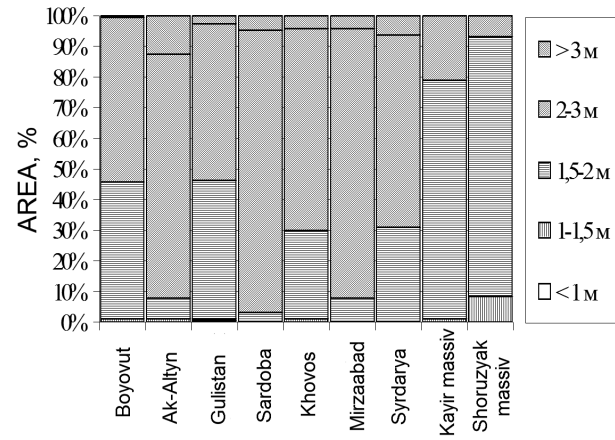
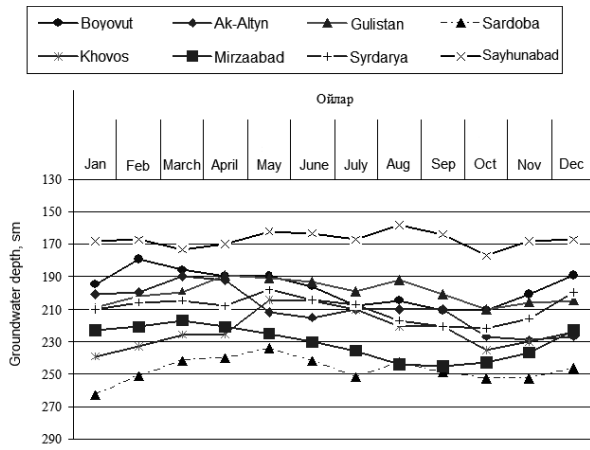


Figure 3. Groundwater mineralization during the vegetation period

Figure 4. Soil salinity level at the end of vegetation period

In case of water resources shortage and propensity to land salinization, the water availability of non-vegetation period should be calculated for (from November until April).

$$B_3^{MB} \eta + B_{K_{II}B} < K_B^{MB} [B]_{MB}^{CC} \psi^{CC} \quad (3)$$

Water demand for non-vegetation period:

$$[B^{MB}] = \sum_{i=S_0}^S \sum_0^F N_{ij} f_{ij} + \sum_{i=1}^n m_j^{B3} f_j^{B3} + O_p^{3sp} f_{3sp}, m^3/ha \quad (4)$$

Here:  $N_{ij} f_{ij}$  — leaching norm and area,  $m^3/ha$ ;  $i$  — level of soil salinity;  $j$  — soil texture;  $S, S_0$  — initial and maximum level of soil salinity;  $m_j^{B3}, f_j^{B3}$  — leaching level and area according to soil texture,  $O_p^{3sp} f_{3sp}$  — wheat irrigation norm and area in non-vegetation period;  $K_B^{MC}$  — coefficient of beforehand identification the

water supply. According to SANIIRI, this coefficient equal to  $K_B^{MB} = 0,90$ .

During the non-vegetation period the water use is not enough over the entire Syrdarya province (30–50%). In Ak-Altyn and Sardoba districts the water use was not enough during the vegetation period (70–76%), while in Sayhunabad district the water has been used more than enough (140%) and in other districts the water supply was sufficient.

Even in Syrdarya basin the water resources are enough, during the non-vegetation period the water use coefficient is very low. Causes of such not efficient use of water resources could be not proper actions during leaching also weakness of technics, fuel and labor.

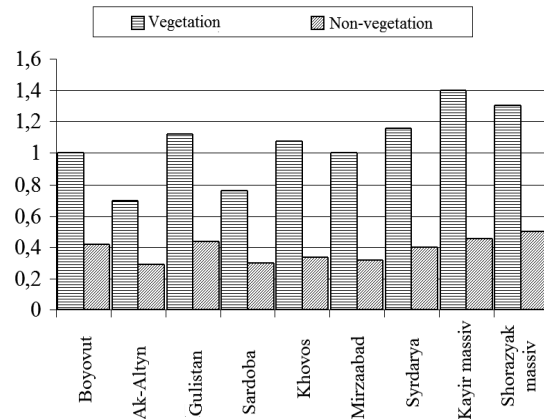
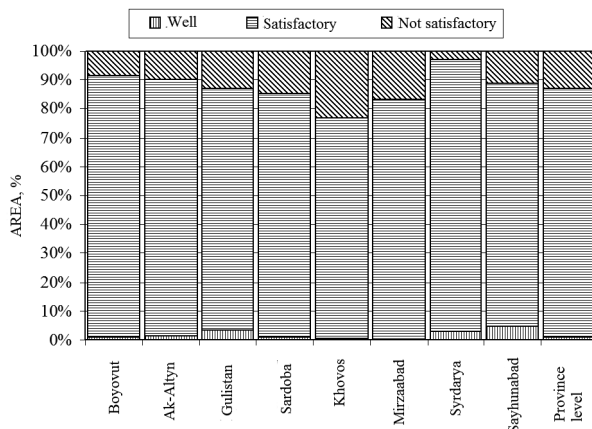


Figure 5. Meliorative status of land according to land cadaster

6. Coefficient of water use by districts

During the year in districts the leaching water supply was not sufficient level (0.77–1.09) (Figure 7) (According to SANIIRI rec-

ommendation should be 1.2–1.3). The coefficient of leaching water over the year can be calculated by using:

$$K = \frac{B_d + O_c + B_{kdc} + B_{sd} - C\delta_a}{ET_d} \quad (5)$$

Here:  $B_A$  — amount of irrigated water by canals,  $m^3/ha$ ;  $O_c$  — amount of rainfall,  $m^3/ha$ ;  $B_{kac}$  — irrigated drainage water,  $m^3/ha$ ;  $B_{BA}$  — irrigated well water,  $m^3/ha$ ;  $C\delta_a$  — amount of drained water from area,  $m^3/ha$ ;  $ET_A$  — amount of evapotranspiration,  $m^3/ha$ ;

Ak-Altyn, Sardoba, Khovos, Mirzaabad districts of Syrdarya province mostly designed with closed drainage systems (46–77%), Gulistan, Syrdarya, Sayhunabad districts with open drainage systems (70–77%) and Boyovut district with vertical drainage systems (57%).

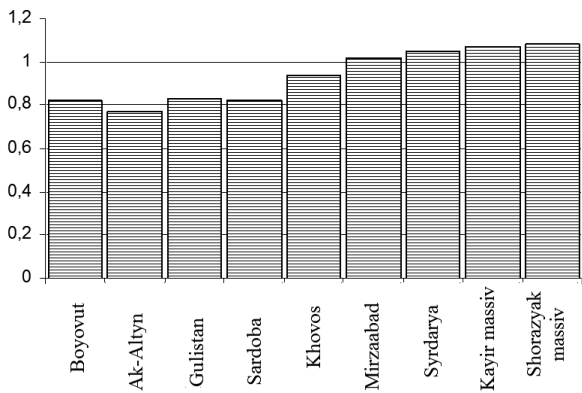


Figure 7. Regime of leaching

In 2011 the productivity of cotton and wheat was diverse. In Boyovut, Ak-Altyn, Gulistan, Syrdarya, Sayhunabad va Sardoba the cotton yield was 2,0–2,8 thousand kilogram per hectare and wheat yield was 4,7–5,4 thousand kilogram per hectare. Meanwhile, in

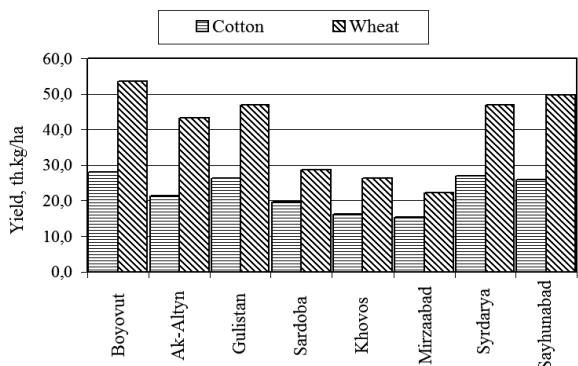


Figure 9. Cotton and wheat yields by districts

Calculation of drainage level [1]

$$D_\phi = \frac{D_r + D_B}{B + O_c + \Phi_{MK} + \Pi - O - C} \quad (6)$$

Here:  $D_r$  — amount of drainage water from horizontal drainage,  $m^3/ha$ ;  $D_B$  — amount of drainage water from vertical drainage,  $m^3/ha$ ;  $B$  — amount of water provided for district,  $m^3/ha$ ;  $O_c$  — amount of precipitation,  $m^3/ha$ ;  $\Phi_{MK}$  — amount of filtration from main canals,  $m^3/ha$ ;  $\Pi$  — amount of water came from underground,  $m^3/ha$ ;  $O$  — amount of water flowed from underground  $m^3/ha$ ;  $C$  — operational water use,  $m^3/ha$ ;

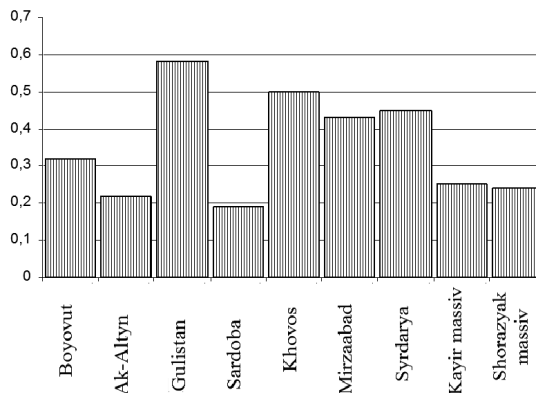


Figure 8. Level of drainages

Khovos and Mirzabad dirctricts cotton yield was 1,5–1,6 thousand kilogram per hectare and wheat yield 2,2–2,8 thousand kilogram per hectare (Figure 9). It show that crop productivity was various according to soil salinity level.

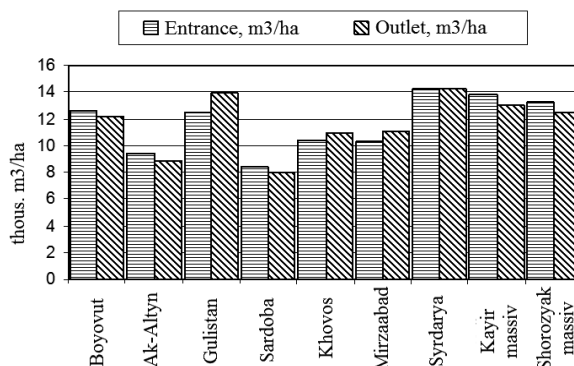


Figure 10. Water balance by district

According to data on total water balance by distrcits the water resources divided variously to districts (10, 11, 12 – Figures)

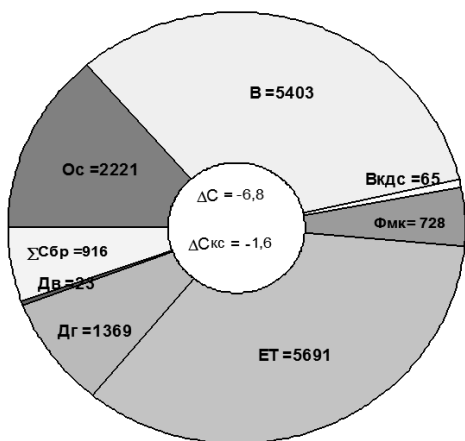
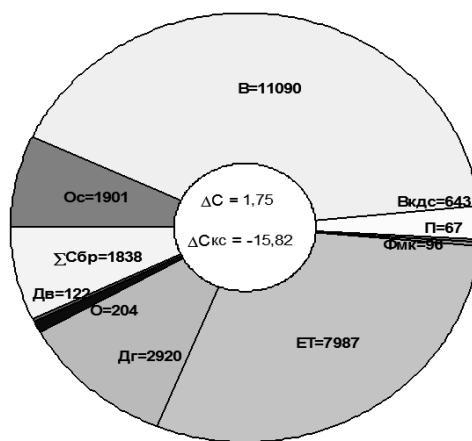


Figure 11. Water balance of Sardoba district



12. Figure Water balance of Kayir massiv (Sayhunabad district)

Here:  $O_c$  — amount of precipitation,  $m^3/ha$ ;  $B$  — amount of irrigated water by canal to district,  $m^3/ha$ ;  $B_{kac}$  — amount of used water

for irrigation from collector-drainage system,  $m^3/ha$ ;  $B_{BA}$  — amount of used water for irrigation from vertical drainage,  $m^3/ha$ ;  $\Pi$  — amount

of water came from underground,  $m^3/ha$ ;  $\Phi_{mk}$  — amount of filtration from main canals,  $m^3/ha$ ;  $ET$  — amount of evapotranspiration,  $m^3/ha$ ;  $\Delta_r$  — amount of water went through horizontal drainage,  $m^3/ha$ ;  $O$  — amount of water flowed from underground,  $m^3/ha$ ;  $\Delta_b$  — amount of water went through vertical drainage,  $m^3/ha$ ;  $\Sigma_{csp}$  — total amount of waste water,  $m^3/ha$ ;  $\Delta C$  — change of salt base over the balance contour;  $\Delta C_{kc}$  — change of salt base in root zone.

#### Conclusion

Has been done complex analysis of meliorative processes in Syrdarya province including water-salt balance, causes and directions for improvements.

Improvement on meliorative status of Syrdarya province in progress and yearly 0.5–21 tons/ha salt has been decreasing. But,

because of inefficient use of water resources and leaching technologies most of lands still salined which effective crop yield.

Structured drainages in irrigated lands are currently functioning in satisfactory level. Nevertheless, if during non-vegetation period the water for leaching will be in required level the technic condition and functioning of drainages will be well.

Rehabilitation of vertical and horizontal drainages also maintain pumps and motors including changing of old parts is needed.

Use of drainage water during vegetation period in Boyovut, Gulistan, Syrdarya and Sayhunabad districts could minimize limit of water use from canals and provides chance to irrigate more water to Ak-Altyn, Khovos, Sardoba, Mirzaabad districts.

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## Section 12. Technical sciences

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### Development technology of manufacturing clothes from fabrics with rarefied structures

**Abstract:** In article are considered results of research of physic mechanical and operational properties of the Uzbek national fabric adras. Influence of a polymeric composition on durability increase thread's connections in these fabrics of the rarefied structures for the purpose of increase in term of operation of products from them is studied.

**Keywords:** Sliding apart threads in seams, polymeric composition, breaking load, rigidity of seam, abr fabric, thread seam, rarefied structure, adras.

The quality of apparel and ability of their long exploitation depend on durability thread connections which quality cannot be definitely estimated. They depend on many factors. Quality indicators that have dominant importance quite often determined by materials features. One of these indicators is sliding apart thread in seams. Then, high durability of fabrics and seams do not guaranty reliability of the item, it can be destroyed in seams [1].

Sliding apart threads in fabric is characterized with displacement of one thread system to another thread system (a basis on a duck and a duck on a basis) under effecting of external forces. This kind of displacement is typical for number of fabrics at the exploitation made clothes from them. The sliding apart of threads can occur on the particular surfaces of the fabric, but frequently it happens near seams that connecting ulnar cut of sleeves, armhole with sleeves, middle cuts of back part, and half parts of skirt and trousers. This is explaining with that this kind of seams in the exploitation process experiencing substantial value of forces that mainly perpendicular directed to seams [2].

Sliding apart threads in fabric is presenting difficulty for the technological process of materials treatment. Appearance rarefied sections in fabric as a result of sliding apart threads is a serious defect of the fabric that characterizes irrationality of it's structure, because it is decreases it's durability and deteriorates appearance of the apparel. Thus, sliding apart causes necessity of introduction additional operations at clothing manufacture for fixing material structure and improvement resistance of seams. Improvement of durability indicators of thread connections in fabrics with rarefied structure allow to improve quality and increase exploitation time of items from these fabrics. Therefore, problem of objective and qualitative assessment of durability thread connections in fabrics with rarefied structures directed to improve items quality and elongation of exploitation time of items from them is very actual task and presents practical and theoretical interest. Analysis of existent

ways of fixing seams from sliding apart shows that from point of view the increasing of resistance are the ways of fixing with using adhesive gasket materials. This increases labor content of producing and require additional equipment and materials.

In manufacturing items from fabrics with high sliding apart most often provided models with free silhouette and on fitted items avoid from using middle seam on back part etc. [3].

The formulated description of the process of manufacturing apparel with using collagen comprising materials was developed and complex of varieties of manufacturing formed collagen comprising apparel details was determined [4]. Also technology of application polymeric membrane in production of apparel was offered, and optimal conditions that supporting most durability of used adhesive joint was determined [5].

With the aim of supporting durability features of thread connections of apparel from fabrics with rarefied structures and increasing of exploitation time, promoting quality, decreasing labor content and materials consumption was developed technology of chemical stabilization and coating liquid-phase polymeric composition on connection seams of the apparel [6].

As the object of chemical technology was chosen protein collagen preparation that was derived from waste products of leather industry. For creation of effective polymeric collagen comprising compositions were used several kind of auxiliary chemical materials.

As is known fabrics with sharply discriminative thicknesses of threads of basis and duck have a great sliding apart. That is why new chemical technology was used for items from adras type abr fabrics that have a great sliding apart because of great discriminative thicknesses of basis and duck threads. Beside this, as analyzing of bibliography showed that physical-mechanical features of adrases were few studied. At the certification teaching and testing laboratory «CentexUZ» at TITLI were realized researches on physical-

mechanical and operational features of adrases and influence of polymeric composition to this features.

The requires to polymeric composition and conditions of it's coating consist of low viscosity, ecological safety, stability in long-term storage, resistance of fixing effect in the structure of textile material and conservation of coating topography in time of next technological operations. In accordance with requires to thread seams that have been treated with chemical compositions was created program and methodology of physical-chemical and mechanical features range research.

They are resistance to sliding apart, durability at tension, low rigidity, resistance to dry-cleaning, washing and ironing, air permeability, resistance of fixing effect in the structure of textile material, resistance to abrasion.

This quality features can be determined by existing standard methodology. Researches on physical-mechanical features were conducted on abr fabrics adras:

1-sample, composition silk threads on basis and cotton fiber on duck, surface density 141,8 g/m<sup>2</sup>;

2-sample, composition silk threads on basis and cotton fiber on duck, surface density 140,4 g/m<sup>2</sup>;

3-sample, composition silk threads on basis and cotton fiber on duck, surface density 137,8 g/m<sup>2</sup>;

4-sample, composition cotton fiber on basis and cotton fiber on duck, surface density 131,4 g/m<sup>2</sup>;

5-sample, composition cotton fiber on basis and cotton fiber on duck, surface density 166,3 g/m<sup>2</sup>.

Preresearches of physical-mechanical and operational features of adrases showed that the fabrics under consideration have high thread sliding apart. Especially it is very high on duck. But chemical technology supporting guarantied increasing of breaking load, resistance to abrasion, decrease of sliding apart in comparison with essential samples.

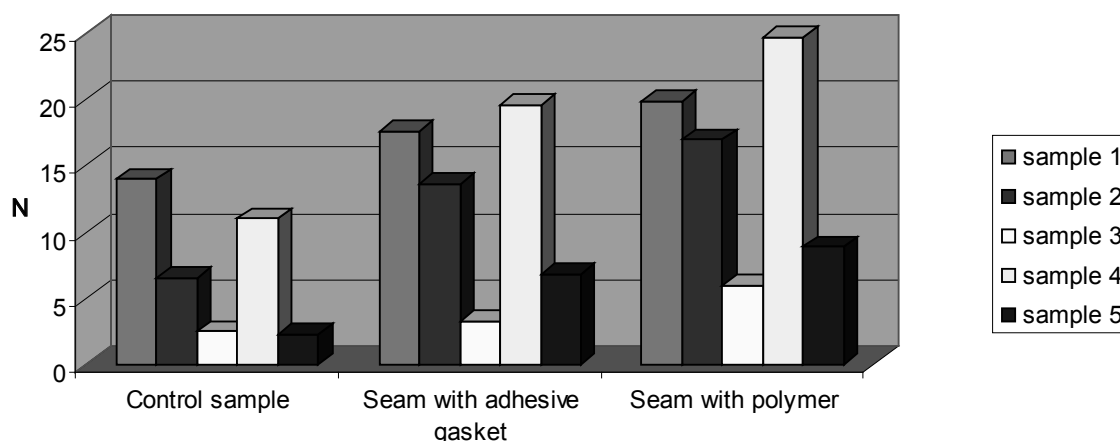


Figure 1. Influence of fixing way to the resistance for sliding apart of threads in seams.

As analysis of results of experimental researches (histogram) showed, durability to sliding apart thread of abr fabrics in fixing seams by adhesive gasket in comparison to control sample that seam did not fixed is increasing on the average of 1,8 times, and breaking load of seam on 1,1 times. At the fixing of seam by polymeric composition resistance to sliding apart in comparison with control sample increased on 2,5 times and breaking load on 1,4 times.

Thereby at research, influence of the polymeric composition for resistance indicators of thread seams shows that chemical technology fixing fabric structure and decreases sliding apart threads in a fabric. Derived technological effect is determined by increase of linkage fabric elements, degree of fixing fiber and threads in fabric structure. This shows the resistance and efficiency of the technological treatment that is more durable from the position of seams sliding apart.

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## Characteristics of electric field of streamer form of the corona discharge with reference to the problems of electrical gas cleaning

**Abstract:** The paper presents the results of research of power characteristics of electric field of streamer form of the corona discharge. Studies have shown that the interacting force of the charge with the electric field, when fed by high voltage unipolar pulses, has a dynamic nature and is determined by the parameters of the elements of feed circuit and the capacity of the discharge gap. Comparative study of power characteristics of electric field of the corona discharge of constant voltage and the corona discharge of streamer form has shown that in the latter case the power of mirror imaging and accordingly the charges are two or more times higher. With increasing frequency the power characteristics also increase.

**Keywords:** electric field, electrostatic precipitator, particle charge, streamer discharge, aerosol particle, the force of mirror imaging, Coulomb force.

The most preferred way to clean the gases from solid or liquid aerosol particles is to use the electrostatic precipitators. The development of the technology of electrical cleaning of gases has been developed in 50–80-s of the last century [1; 2]. Highly efficient devices, providing a high degree of cleaning have been designed. The scope of application of the electrostatic precipitators has been considerably expanded. The production of uniform electrostatic precipitators have been established providing the cleaning of combustion gases of the boilers of large power units of 300, 500 and 800 MW, large furnaces in cement production and other technological devices.

Since the beginning of the 80s of the 20th century the major work on electrical gas cleaning was mainly associated with an increase in the efficiency and reliability of already developed electrostatic precipitators. Power units of electrostatic precipitators of ATP type have been developed. Through the use of silicon thyristor rectifier and other semiconductor devices the reliability of the units has been significantly improved. Developed principles of voltage regulation made it possible to maintain on the electrodes of electrostatic precipitators a higher load, providing a high degree of cleaning [2].

Noting the great technological advances in electrical gas cleaning, we would analyze the causes that prevent a wider use of electrostatic precipitators in the process of cleaning of exhaust gases in industry, as well as their use for air cleaning from solid and liquid aerosol particles in industrial, civil, medical and residential quarters.

In the first place one should note a significant size and weight of electric filters and high power consumption. The dimensions of electric precipitators of UGZ series are from 18,6x12x15,4m to 24,8x21,8x27m, with the setting zone of aerosol particles  $A_1 = 15,4-27$  m. For power supply of electrostatic precipitators a power source with a capacity up to 200kVA is used. The rate of gas flow to be cleaned is  $V_1 = 1-1,5$  m/c. If to reduce the setting zone to  $A_2$ , and to increase the gas flow rate up to  $A_2$ , the power consumption of electric precipitators at the same capacity will decrease in  $[(V_1 / V_2) \cdot (A_1 / A_2)]$  times. The sizes of electrostatic precipitators will be reduced proportional to power.

In the electrostatic precipitators a corona discharge of constant voltage is used. The features of this type of self-discharge in gases are the oscillations in wide range of amplitude and frequency of the discharge current, the blocking of the discharge, its transfer into the spark or arc shapes [2].

The improvement of the efficiency of the process of electrical gas cleaning may be carried out at the discharge current stabilization [3].

To achieve this objective is possible by increasing the efficiency of gas cleaning in electric fields. The main determinant factors of this process are the values of the charge in trapped particles  $G$  and electric field intensity between the electrodes of the electric precipitators  $E$ . The amount the charge of aerosol particles is a function of electric field intensity. Therefore it is necessary to increase the electric field intensity. When using constant voltage in electrostatic precipitators,  $E$  is set to pre-breakdown voltage values. It is therefore necessary to develop a method that allows to increase the electric field intensity.

An increase in electric field intensity can be achieved using the unipolar pulses of high voltage with porosity of more than 5 and the regularities (laws) of electric intensity increase of gases while reducing the exposure time of the voltage pulse [4,5]. This regularity is determined by surge voltage ratio

$$K = U_{A.H} / U_{np.H}, \quad (1)$$

where  $U_{A.H}$  — is an amplitude of voltage pulse;

$U_{np.H}$  — is a breakdown voltage of the gas at a constant voltage.

According to [4,5], at surge voltage ratio of more than 0.15 and with the parameters of discharge gap of electrostatic precipitators there appears a streamer form of corona discharge, its experimental studies are presented below.

Aerosol particles in electric fields of a corona discharge are affected by the forces of various physical nature. Coulomb force, i. e. an interaction of a charge on the particles with electric field, is a determining one at the setting of aerosol particles. The remaining forces are ten times less, and in practical calculations are not counted.

Coulomb force for homogeneous electric fields when fed by constant voltage is determined by a simple dependence:

$$F_k = GE, \quad (2)$$

where  $G$  — is an excess charge of aerosol particle;

$E$  — is an electric field intensity.

In sharply inhomogeneous electric fields used in electrostatic precipitators, electric field intensity is the highest in the areas directly adjacent to the corona-forming electrodes. Therefore, the Coulomb force will depend on the location of the particle in the inter-electrode space, i. e. on its coordinates:

$$F_k = G_{grad} E. \quad (3)$$



In sharply inhomogeneous electric fields when powered by unipolar voltage pulses, the electric field intensity will vary with time. Therefore the Coulomb force will be determined by the dependence:

$$F_k = G_{grad} E(t). \quad (4)$$

Electric field intensity in electric field of streamer form of corona discharge varies according to the law [3]:

$$E(t) = \frac{[1/(p_2 - p_1)] [(p_2 U_a - i_a) p_1 e^{p_1 t} - (p_1 U_a - i_a) p_2 e^{p_2 t}] + U_a}{H}, \quad (5)$$

where  $p_1, p_2$  — are the roots of characteristic equation.

$$p_{1,2} = \frac{-C_1 C_2 R \pm [(C_1 C_2 R)^2 - 4(C_1 C_2 L)(C_1 + C_2)]^{0.5}}{2C_1 C_2 L}, \quad (6)$$

where  $C_1, C_2, R, L$  — are the parameters of power circuit of the discharge gap by unipolar voltage pulses.

It follows that in electric fields of streamer form of corona discharge the Coulomb force is determined by the parameters of power

source elements, i. e., there is a dynamic mode of the process, in contrast to the electric fields of corona discharge of constant voltage where this relationship is practically non-existent.

To confirm the relationship (5) an experiment was conducted in which the change in interaction forces between the electrodes when powered by unipolar voltage pulses was studied. A stand for this investigation (Figure 1, a) consists of an earth electrode 5 — a disc of aluminum alloy 0.5 mm thick, with six springs 4 it is suspended on the dielectric hoop 3 (Figure 1, b). To the center of the earth electrode with rigid rod a mechanotron 1 is connected [6], the corona needles 6, of the length of 25 mm and a cone angle of 8°, are mounted on a dielectric disk 7, according to the scheme shown in Figure 1b. The experiment was conducted with/and without the shielding electrode 8 to define the effect of discharge gap capacity on the interacting force between the electrodes. In the experiment the average electric field intensity equal to  $7 \times 10^5 \text{V/m}$  was established according to the current value of voltage pulse with a frequency of 75 pulses/s<sup>-1</sup>.

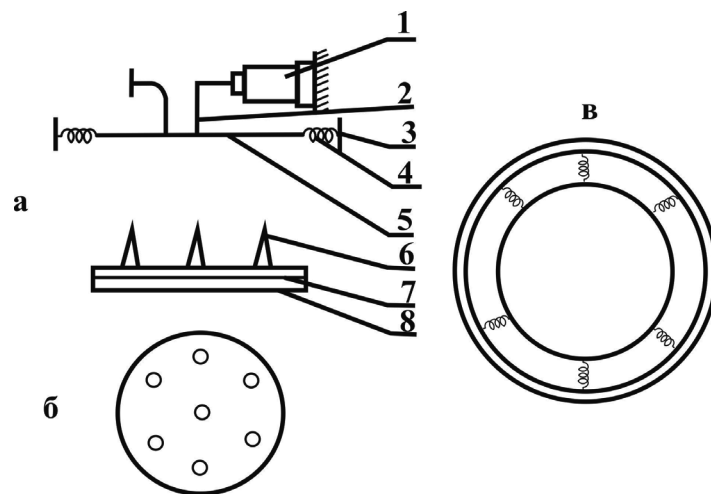


Figure 1. Scheme to study the character of changes of electric field intensity in the discharge gap when feeding voltage pulse (a), the discharge needles arrangement (b), the suspension of earth plane (c)

Oscillograms of the power of attraction and thus the variation of electric field intensity in discharge gap (lower) and the type of voltage pulse (upper) are shown in Figure 2. According to the oscillograms it is seen that the force of impact on earth electrode only by pulse edge adequately describes the form of voltage pulse. The am-

plitude of the force delays in time the amplitude of voltage pulse. The decline in the momentum of force is adequately described by formula (5). Comparing oscillograms of the process taken without the shielding electrode and with the shielding electrode shows that the process of force pulse decay in the presence of shielding electrode goes slower.

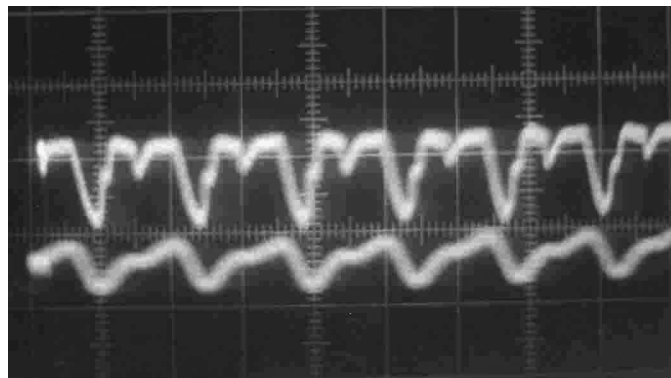


Figure 2. Oscillograms of voltage pulse (upper) and the interaction forces between the electrodes (lower)

A comparison of power characteristics of the electric field of corona discharge of constant voltage and of streamer form was conducted by the force of adhesion of the particles of material to the earth plane. In this case, the particles are retained on the earth plane by mirror image force, the magnitude of which is proportional to

the square of charge magnitude on the particle of material and is inversely proportional to the square of the distance between the center of the charge and its reflection on the plane.

The studies were conducted in the following manner (Figure 3). From fluoroplastic (Teflon) layer with thickness of 0.15 mm a circle

2 was cut with diameter of 20mm and it was placed at the center of the earth plane 3 by corona needle 1. A kapron yarn 6 was attached to the edge of the circle; its other end was attached to a spring dynamometer 4. The dynamometer by a thread 6 was attached to the drum of a micromotor by reduction gear 5. The electrode spacing was adjusted by a clamp 7.

The electrode spacing is 40mm.  $2,4 \times 10^4$ V voltage was supplied to corona needle. In the experiment to eliminate the influence of the Coulomb force, i. e., interaction of the particle charge with an external electric field, the test body was charged from the corona needle electrode, and then the corona electrode via a high-voltage circuit breaker was grounded and simultaneously the electric motor was switched on. The force of mirror imaging was determined by

the dynamometer at the time of separation of fluoroplastic (Teflon) circle from the earth plane.

The charge in *cl* of fluoroplastic (Teflon) circle was calculated according to the formula

$$G = (2Fr^2)^{0.5}, \tag{7}$$

where *F* — is a static friction tearing off the circle from the earth plane, H;

*r* — is a thickness of fluoroplastic (Teflon) layer, m.

Specific surface density of the charges in *cl/m* is given by:

$$\sigma_s = G / S, \tag{8}$$

where *S* — is the area of fluoroplastic (Teflon) circle, equal to 1256 mm<sup>2</sup>

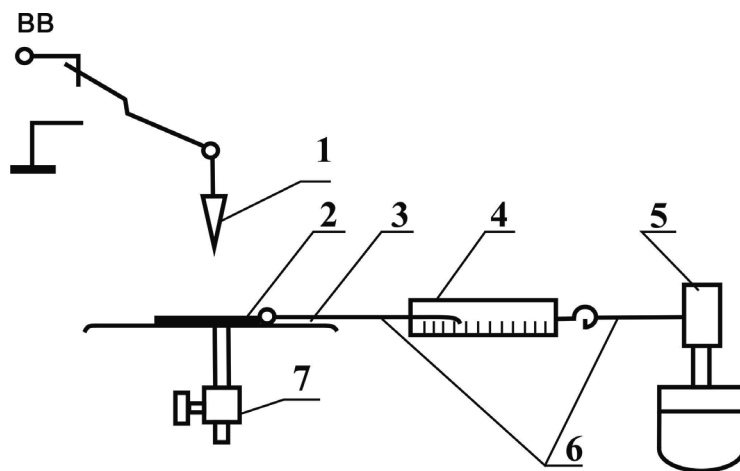


Figure 3. Stand scheme to measure the force of adhesion of the test body to the earth plane

The experiments were performed with threefold repeatability. In the experiments to eliminate the influence of the Coulomb force (interaction of the charge of test body with an external electric field),

the test body was first charged from the corona needle electrode, then the corona needle with high-voltage switch was grounded, and the force of adhesion of the test body to a grounded plane was measured.

Table 1. – Results of comparative studies of the force of mirror imaging in electric fields of corona discharge of constant and pulsed voltage

Parameters	Parameters values					
Pulse rate, pulses <sup>-1</sup>	Constant voltage	70	122	154	200	210
The force of mirror image, H	0,62	1,11	1,21	1,37	1,63	1,44
Surface charge, 10 <sup>-4</sup> cl	0,747	1,0	1,04	1,11	1,21	1,14
Surface density of the charge, 10 <sup>-4</sup> cl/mm <sup>2</sup>	9,48	12,64	13,2	14,06	15,32	14,4
Force excess of mirror image		1,79	1,94	2,21	2,63	2,31

Analysis of results of measurements (see Table 1) shows that the mirror images substantially depend on the frequency of voltage pulse and increase up to the frequency of 200 pulses<sup>-1</sup>, then decrease. This is due to the fact that for the used power schemes the limit frequency of the stability of streamer form of corona discharge is 200pulses<sup>-1</sup>. At this frequency, the power of mirror image is 2.63 times greater than similar power at corona discharge of constant voltage. Similarly, the magnitude of the surface charge and its density are increasing. From this conclusion it follows that in electric fields of streamer form of corona discharge the efficiency of setting of aerosol particles will occur more effectively than in electric fields of corona discharge of constant voltage.

**Conclusions**

1. In electric fields of streamer shape of corona discharge the force of the effect on the particles of material depends on the nature of changes in electric field intensity, which depends on the voltage pulse amplitude and the parameters of the elements of supply circuit and on the capacity of technological discharge gap.

2. Power characteristics of electric fields of streamer form of corona discharge and the values of charges on the particles of material are two or more times higher than similar parameters of electric fields of corona discharge of constant voltage. With an increase in pulse rate the power characteristics increase to a critical value of frequency at which the stability of discharge processes is disturbed.

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## Restoring degraded arid pasture in Uzbekistan

**Abstract:** In article are brought results of the improvement pasture by strip tillage of soil and sowing seeds of the fitomeliorative plants.

**Keywords:** Restoration; strip tillage; fitomeliorents; forage productivity; Uzbekistan.

### Introduction

Uzbekistan is located in Central part of Central Asia. The large part of republic, extending, from north-west to south-east, is plain, engaged the deserts and steppes, the south-east part engaged the hills and mountains.

Use by person of lands in drought zones as a pastures, changes of adapted systems, conversion of natural grassland to cropland with large temporary and space fluctuations of precipitation, soil humidity and productivity of plants resulting in rapid expansion of land desertification in the arid and semiarid region of Uzbekistan.

Discussions of the causes, indicators of desertification, restoration technologies applied in the Central Asia region represented in the literature [1–10].

Causes can be categorized and briefly summarized in three groups: a) natural factors (solar radiation, windy regime, high evaporation, slopes of lands surface, soil salinity, growth and encroachment of mobile sand bodies zoogenic factors and etc.); b) anthropogenic factor (roads, moving technics, irrigation, agricultural practice, ranching, mining, tourism, woodcutting, excessive pasture of cattle, military factor and etc.); c) a combination of (a) and (b) (the degradation of vegetative cover due to overgrazing, soil erosion, water logging, salinization of irrigated lands and etc.).

The purpose of this paper is research the possibility of the restoring or improving of the rangelands with minimum soil tillage and sowing fitomeliorents, and maximum keeping of existing vegetation cover.

### Materials and methods

The experiments were organized in two places: Kizilkum and Nurata stations of the Karakul Sheep Research Institute.

The restoration site soils are sandy loam at Kizilkum and grey loam soil at Nurata which are highly susceptible to wind and water erosion.

Investigation site of 100m x 50m was selected in area with low vegetation cover. The site was subdivided into 10m x 10m subplots. Plant species was recorded in there 1 x 1m quadrates in each subplot before and after treatments.

Experiment implies comparative studies of germination and development fitomeliorents under plowing at the depth 0.20 m and strip tillage at the same depth. Strip tillage treatment implies a cultivation action with sub-soiler implements to a different depth

and 150mm wide. Distance between strips was 600... 700 mm. The sowing fitomeliorents was made at February, number of germinated species is determined on each sub-plot at April. The dynamics of growing of the plants was assessed upon their height, which was determined in each quarter, four times at year.

Soil samples were collected in January, March, May, July and September at three points in each sub-plot.

For seeding treatments were selected shrubs (*Haloxylon aphyllum*, *H.persicum*, *Salsola Paletzkiana*, *S.richter*, *Ephedra strobilacca*, *Calligonum* spp.) dwarf shrubs (*Kochia prostrata*, *Comphorosma Lessing*, *Salsola Aorientalis*, *Ceratoides evermanniana*), grasses (*Poa bulbosa*, *Agropyron desertorum*). This species characterized by their ability withstand long droughts and low humidities, nutrient deficiencies, high soil salinity, extreme high summer and low winter temperatures.

For interpretation of the data in this study least significant difference (LSD) values were reported at the 5% level of significance.

### Results and discussion

Restoring degraded rangelands by sowing fitomeliorents

Germination ability, output of germinated plants, water accumulation and total forage productivity restored sites were determined by different technologies of preparing of soil. Were compared plowing by mouldboard ploughing at the depth 20–22 cm following hand sowing and harrowing and strip tillage (15cm x 70cm) at the same dept and sowing by combination machine. As a fitomeliorents were taken *Haloxylon aphyllum*, *Halothamnus subaphyllus*, *Ceratoides evermanniana*, *Kochia prostrata*, *Salsola orientalis*.

Number of sowing and germinated plants are shown at table 1. Germinated plants at plowing were 0.55–17.0%, mean germination ability was 2.62%, at strip tillage respectively — 0.49–12.8%, mean value — 2.67%. On germination ability difference at compared variants was not significant.

Total water storage at the plowing in the January was about 5.0%, in May about 38% more than at strip tillage (Fig. 1, a). Top layer of soil accumulate more precipitation water at plowing, but due to increasing evaporation at the July water contents at this compared variants are not significant.

Total forage productivity restored areas at strip tillage were always more than at plowing. (Fig 1. b). At the first year after treatments total productivity plots at strip tillage was (35.6%)

more than at plowing plots, these differences were 21.2% at the second and 18.9% at the third years. Strip tillage increase produc-

tivity due to storage (keeping) natural plants and creating favorable conditions for growing of sowing and existing plants.

Table 1. – Number of sowing and germinated seeds at plowing and strip tillage

Plants	Plowing				Strip tillage			
	Number of seeds	%	Germinated seeds	%	Number of seeds	%	Germinated seeds	%
Haloxylon aphyllum	215	100	4,95±0,11	2,3	215	100	8,72±0,52	4,0
Halothamnus subaphyllus	50	100	8,57±0,91	17,0	50	100	6,42±1,54	12,8
Ceratoides eversmanniana	80	100	9,12±1,14	11,3	80	100	8,77±1,97	10,9
Kochia prostrata	850	100	4,7±0,62	0,55	850	100	4,17±1,54	0,49
Salsola orientalis	230	100	10,6±1,42	4,6	230	100	10,2±1,89	4,4
Total			37,9	2,65			38,2	2,67

Restoring by sowing fitomeliorants at different combination of components.

Germination ability, dynamics of growing, output of germinated plants and total forage productivity were investigated at different depth of seeding, depth of tillage and different combination of the

components at strip tillage technology. Germination and growing sowing fitomeliorants and minimum output of germinated plants were at the depth of seeding 1–2cm and at the tilling depth 20 cm. Results of growing at the first year after treatments and productivity plant species were shown at the Tabl. 2.

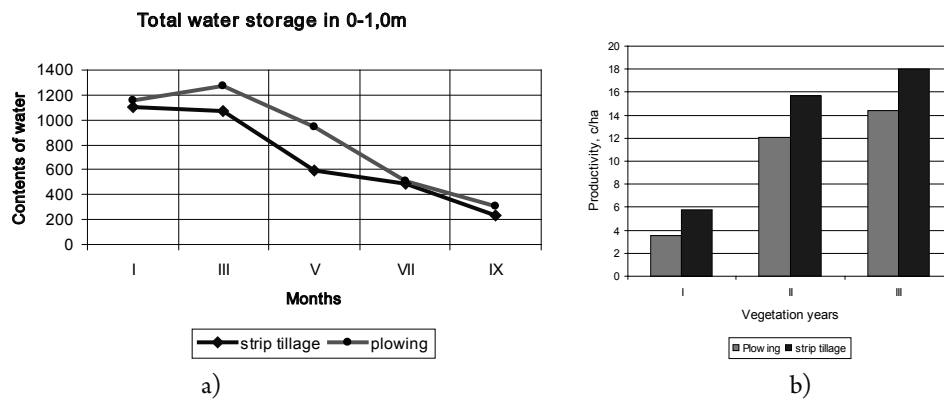


Figure 1. (a) Total water storage in 0–1.0 m; (b) Total forage productivity of restored ranges.

Total forage productivity at the combination  $S_{25}+D_{50}+G_{25}$  (9.8 c/h) 37.6% and 39.9% respectively. (16.3 c/h) was more than  $S_{50}+D_{25}+G_{25}$  (10.2 c/h) and  $S_{25}+D_{25}+G_{50}$

Table 2. – Dynamics of growing fitomeliorants at different proportion of components

Variant of combination	Component and proportion	Dynamics of growing, cm			
		25.08.2014	25.09.2014	25.10.2014	25.11.2014
$S_{50}+D_{25}+G_{25}$	Haloxylon aphyllum, 50%	58.3	64.7	69.4	71.8
	Salsola orientalis, 8%	40.1	48.7	53.3	58.2
	Halothamnus subaphyllus, 9%	16.7	21.2	23.7	25.8
	Kochia prostrata, 8%	56.4	72.1	79.8	83.2
	Climacoptera lanata, 13%	39.6	48.2	53.4	55.3
	Agropiton desertorum, 12%	51.7	60.3	66.2	70.6
$S_{25}+D_{50}+G_{25}$	Salsola orientalis, 16%	34.4	42.3	51.5	54.8
	Haloxylon aphyllum, 25%	59.3	69.8	73.4	78.2
	Halothamnus subaphyllus, 18%	15.2	18.3	21.4	25.7
	Kochia prostrata, 16%	57.8	75.2	81.6	85.4
	Climacoptera lanata, 13%	36.5	46.8	52.3	55.1
	Agropiton desertorum, 12%	50.2	61.4	67.7	69.7
$S_{25}+D_{25}+G_{50}$	Haloxylon aphyllum, 25%	53.6	67.2	70.7	73.5
	Salsola orientalis, 16%	45.9	59.4	62.3	66.4
	Halothamnus subaphyllus, 18%	15.7	19.1	23.3	26.4
	Kochia prostrata, 16%	59.3	76.8	82.5	85.9
	Climacoptera lanata, 13%	41.2	53.6	57.1	59.5
	Agropiton desertorum, 12%	54.3	61.8	68.1	73.6

**Conclusions**

Accumulation of water creates favorable conditions for growing desert plants. Strip tillage allows to keep existing plant species and

promotes better germination and establishment seeded fitomeliorants, total forage productivity at sowing of fitomeliorants more than at plowing and sowing.

Strip tillage and sowing fitomeliorants at the combination  $S_{25}+D_{50}+G_{25}$  (Shrubs – 25%, Dwarf shrubs – 50%, Grasses – 25%) creates favorable conditions for seeded fitomeliorants and allows to create all-year-round pastures. Total forage productivity restored/improved rangelands considerably more than other combinations of components.

#### Acknowledgments

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## Brightness transformation of image with adaptive blocks, research of its efficiency in compression and estimation of reconstructed image quality

**Abstract:** This article discusses the method of converting the luminance of the adaptive block partitioning, which allows you to select and remove the image uniformity. It also provides the experimental results obtained by the study of the effectiveness of this method and the evaluation of the reconstructed images.

**Keywords:** image compression, conversion, block partition.

**Introduction.** Today there are many different techniques and video standards that provide good image quality at bit rate more than 3–5 Mbps. However, at the moment an important task is to develop efficient methods of compression, providing the transmission of broadcast TV programming stream via cellular communication at a speed of 2 Mbps [1].

**Main part.** To improve the efficiency of image compression the image's pixels' brightness changing the image has been proposed [2; 3]. The method starts work with dividing the image into square blocks of arbitrary size ranging from 32x32 to 2x2 pixels within which the luminance value is set in such a way that on the one hand, to bring it closer to zero, on the other hand, to make more uniform the entire brightness frame field, as shown in Figure 1.

As can be seen from Figure 1, on certain types of images can be obtained a full uniform image, which statistical information is well below 300–500 times by the RLE long series compressor.

However, these are provided only for certain types of synthetic images and on a normal picture some violation of the uni-

formity of brightness of the adjacent blocks (fig. 2) appears, which significantly reduces the effectiveness of the method. Therefore, we proposed adaptively changing block sizes method, depending on changes in the brightness of the source image structure [3].

In this algorithm, whose block diagram is shown in fig. 3, the procedure of finding the same areas of the image is carried out. This means that for the transmission of information on the areas having the same chrominance levels (monochrome), only the necessary area and color layer will transfer. This method is similar to the Huffman conversion, where the transmission of the same portion of the repeating elements, you must have one of the elements and the number of repetitions it [4].

This algorithm works as follows. The image is divided into blocks of size 2x2; between these 4 pixels the minimum luminance value will be found. Then, the minimum value is subtracted from each pixel in the block. Results are compared with the error factor, the size of which is determined by the formula  $2,55^*k$  (where k — is the user set percentage and is called the percentage error). If the difference is less than a pre-

determined number, then all the 4 pixels are considered to be similar, and will continue to be considered for the 2x2 block, and, in the further processing of the image of the four pixels of the block will be taken

away its minimum value, making it more uniform. If the difference is greater, respectively, the pixels are not similar, so will be written to the output file unchanged.



Fig. 1. Original, converted and restored image colored stripes accordingly



Fig. 2. Initial and compensated and restored the image with the appearance of the 'block' effect of the reconstruction accordingly

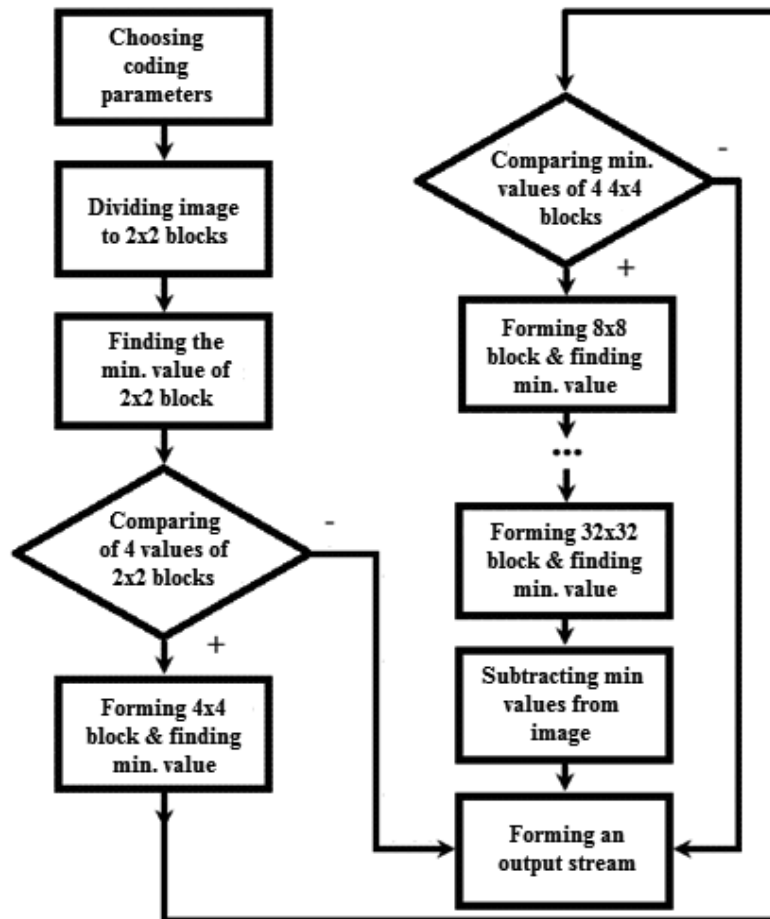


Figure 3. The block diagram of the adaptive partitioning the image on the variable-sized blocks

If the 2x2 blocks are found, they are compared with each other as well as pixels, i.e. four 2x2 block to be merged into a single block

of 4x4 pixels. This is done as follows: there is a minimum, i.e. the minimum value of 2x2 blocks (four) this is the minimum value for

a 4x4 block having 16 pixels. The obtained value is subtracted from the others the results are compared with factor error. If all four less than the difference, then the block will have a 4x4 size, if at least one value greater than a predetermined error, the 2x2 blocks are stored in separate blocks in a metafile. In this way, all the pixels are processed images, conventionally dividing into blocks. Comparing the blocks in the algorithm can be adjusted to the size of 32x32 pixel macroblock, that is, from the 1024 unit will be taken away by one (minimum) value.

After finding and conditional division into blocks of the image is processed, all found values are subtracted from the original image, depending on their location. The result is an image with the same dimensions, but changes the color. As greater identical areas in the image, as image is more uniform and thus the output can be highly compressed without deteriorating the visual quality. The block coefficients are written metadata signifying their size, and color of a

minimum value so that the image can be restored in the decoding. For example, if the decoder reads from the array 5 metadata value (identifier 32x32 block), it means that a value of a 32x32 pixel block in the need to add the next number is the minimum value for this block.

To evaluate the efficiency of this method a number of studies was carried out, followed by compression-coded images by compression algorithm based on discrete cosine transform as in standard JPEG with different parameters. This coding was done in different color models: for the experiment were chosen model, RGB and YUV 4: 4: 4.

As for the original form recovery of transformed image blocks necessary to store metadata coding parameters for evaluating the effectiveness of this method is also compressed metadata files long series of algorithms (RLE) and Huffman which are used in the standards: ARJ, ZIP, RAR.

Table 1. – The plot of compression results in Kbytes

Compression	Source frame		RGB				YUV 4:4:4			
	Initial size	Compressed frame (Kb)	The amount of the error				The amount of the error			
			100%	80%	20%	1%	100%	80%	20%	1%
Lossless	1,1 MB	317	319	322	334	308	330	330	333	315
20 times		90	90.9	91.8	89.3	74.2	69.3	69.3	67	53.7
50 times		50	50.4	51	47.1	36.6	36.8	36.9	33.4	23.4
<b>Compression metadata files</b>										
ARJ			1.71	4.24	57.5	223	1.26	1.42	15.7	126
ZIP			1.86	4.35	57.5	225	1.36	1.51	15.7	128
RAR			1.53	4.25	50.3	170	1.11	1.26	15.5	100

To demonstrate the results obtained when testing the present method, the plot shows the results of compression, as well as

evaluation of its effectiveness, which are shown in Tables 1–2 and histogram (Fig. 4).

Table 2. Evaluation of the plot of compression efficiency

Compression	The average amount of personnel in the amount of metadata							
	RGB				YUV 4:4:4			
	100%	80%	20%	1%	100%	80%	20%	1%
Lossless	320,53	326,25	384,3	478	331,11	331,26	348,5	415
20 times	92,43	96,05	139,6	244,2	70,41	70,56	82,5	153,7
50 times	51,93	55,25	97,4	206,6	37,91	38,16	48,9	123,4
<b>Compression efficiency</b>								
<b>RGB</b>								
	100%	80%	20%	1%				
Lossless	0,99	0,97	0,82	0,66				
20 times	0,97	0,94	0,64	0,37				
50 times	0,96	0,9	0,51	0,24				
<b>YUV 4:4:4</b>								
	100%	80%	20%	1%				
Lossless	0,96	0,96	0,91	0,76				
20 times	1,28	1,32	1,09	0,59				
50 times	1,31	1,02	1,02	0,41				

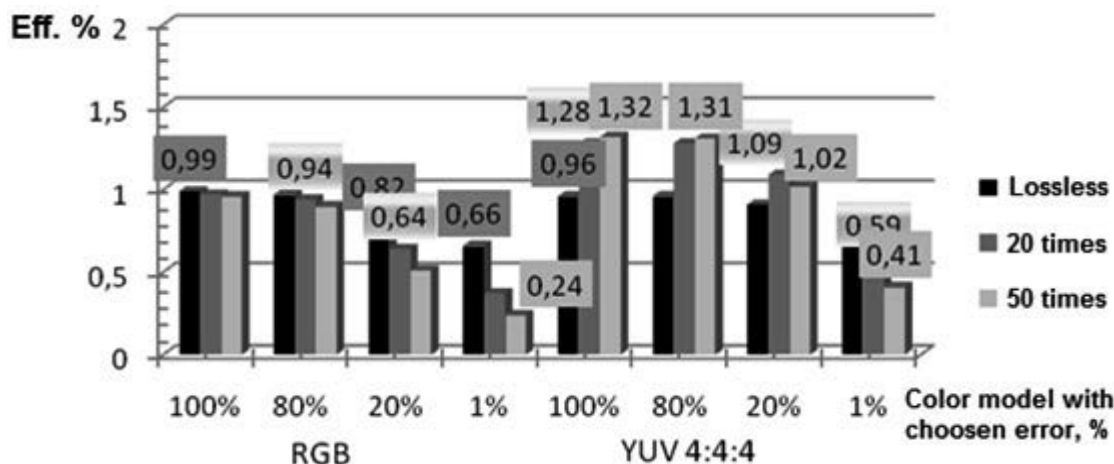


Figure 4. Assessment efficiency when image compression processing in different color models

This graph shows that the highest efficiency in coding compresses the image in YUV color model 4: 4: 4. This is due to the fact that this model provides a better grip when using the DCP by using different color difference components. As is known, the human eye is more sensitive to color brightness than to its color components. Model 4: 4: 4 is used as a time when imaging, are saturated with a rather small details and sharp transitions in color difference components.

The effectiveness of image reconstruction was estimated standard deviation of MSE (mean square error) and PSNR (Peak Signal to Noise Ratio), which are calculated according to the formulas [5]:

$$MSE = \frac{\sum_{k=1}^{w \cdot h} Org_k - Re s_k}{w \cdot h}; \quad (1)$$

$$SNR = 20 \cdot \log_{10} \frac{255}{\sqrt{MSE}}. \quad (2)$$

According to the calculations of all the studies, the compressed image reconstruction error with the same error recovery algorithms applied JPEG, i. e. the proposed conversion method does not affect image quality.

**Conclusion.** The proposed method allows to obtain high homogeneity and a correlation between pixels, thereby increasing the compression ratio in some images, however, additional metadata input for further recovery, increases the volume of the final output file. Compression using standard metodannyh archives increases the efficiency of the method. Therefore, the use of archiving algorithms after the proposed brightness changes will involve an increase in the compression ratio.

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## Estimation of velocity fields beyond transverse dams at the region of flow potential energy restoration

**Abstract:** Using main clauses of the theory of turbulent jets, the authors introduce relationships to calculate velocity fields and length of restoration region of the potential energy of flow constrained by bilateral floodplain dams.

**Keywords:** floodplain, channel, momentum conservation equation, discharge conservation equation, traction forces, velocities in channel, velocities at floodplain, length of potential energy restoration.

Rapid population growth in Uzbekistan, reaching 34,7 mln in 2025, will put on agenda the task of effective use of available land resources, including floodplain lands, and also the task guaranteed water supply into irrigation canals. These tasks can be solved by construction of transverse dams on river floodplains, since erecting transvers dams from local material is much cheaper than bank paving longitudinally.

On the other hand, the regional ecology of rivers in the Aral sea basin is worsening. Construction of regulation structures improves the local ecology: prevents riverside lands from water erosion, allows for regulation of floodplain land use, facilitates the drop of river wa-

ter level for the purpose of improving reclamation state of riverside lands, and, in addition, nowadays the question arose about bringing water to Aral by regulating Amudarya river floodplain at its delta.

Meanwhile, the movement of flood itself in channels with immersed floodplain forms under influence of channel and floodplain complex morphology and roughness, kinematic and dynamic interaction of channel and floodplain flows. At present, there is no methodic for designing bilateral transverse dams at floodplains, therefore conducting high-cost research is needed to justify such projects.



It is known that flow spreading is mainly influenced by structural characteristics of dams: degree of contraction, symmetrical or asymmetrical contraction, installation angle, and morphological characteristics of floodplain: depth, unilateral or bilateral, same roughness, varying roughness, hydraulic regime, and etc. [1; 2; 3; 4; 5].

Area III is characterized by that flow potential energy is restored  $i>0$ . Flow velocity along riverbank can't be ignored, besides it is necessary to know the magnitude of these velocities in order not to allow for erosion of this bank.

The pattern of width change in the first zone of mixing

$$\bar{\epsilon}' = \bar{\epsilon}'_{\kappa_1} + 0,1x; \bar{\epsilon}' = \bar{\epsilon}'_{\kappa_1} + 0,1\zeta; \bar{\epsilon}'_{\kappa_1} = \bar{\epsilon}'_{\kappa_1}/\bar{\epsilon}_0; \bar{\epsilon}'_{\kappa_1} = \bar{\epsilon}'/\bar{\epsilon}_0; \quad (1)$$

In the second zone it stays the same as before

$$\bar{\epsilon}'' = \bar{\epsilon}''_{\kappa_1} + 0,27x; \bar{\epsilon}'' = \bar{\epsilon}''_{\kappa_1} + 0,27\zeta; \zeta = x/\bar{\epsilon}_0 \quad (2)$$

Since we are analyzing symmetrical flow contraction, flow failure is not observed for the reason of floodplain symmetry and the

$$\begin{aligned} & \rho h_{n\kappa} \int_0^{y_1} U^2 dy + \rho h_{n\kappa} U_{n\kappa}^2 \bar{\epsilon}'_{\kappa_1} + \rho h_{n\kappa} \int_0^{y_1} U^2 dy + \rho h_{pc} \int_{\bar{\epsilon}_n}^{\bar{\epsilon}_n + \bar{\epsilon}_p} U^2 dy + \rho h_{pc} U_{p\kappa_1}^2 \bar{\epsilon}_n + \rho h_{pc} \int_0^{\bar{\epsilon}_p} U^2 dy + \rho h_{pc} \int_{\bar{\epsilon}_p}^{\bar{\epsilon}_p + \bar{\epsilon}_n} U^2 dy + \rho h_{n\kappa} U_{n\kappa}^2 \bar{\epsilon}''_{\kappa_1} + \\ & + \rho h_{n\kappa} \int_{y_5}^{y_6} U^2 dy = \rho h_{n\kappa} \int_0^{y_1} U^2 dy + \rho h_{n\kappa} U_{n\kappa}^2 \bar{\epsilon}'_{\kappa_1} + \rho h_{n\kappa} \int_0^{\bar{\epsilon}_n} U^2 dy + \rho h_p \int_{\bar{\epsilon}_n}^{\bar{\epsilon}_n + \bar{\epsilon}_p} U^2 dy + \rho h_p U_p^2 \bar{\epsilon}_n + \rho h_p \int_0^{\bar{\epsilon}_p} U^2 dy + \rho h_p \int_{\bar{\epsilon}_p}^{\bar{\epsilon}_p + \bar{\epsilon}_n} U^2 dy + \rho h_{nn} U_{nn}^2 \bar{\epsilon}''_{\kappa_1} + \\ & + \rho h_{nn} \int_{y_5}^{y_6} U^2 dy + \gamma \frac{B_p}{2} (h_p^2 - h_c^2) + \gamma \frac{B_{n\kappa}}{2} (h_{n\kappa}^2 - h_c^2) + \gamma \frac{B_{nn}}{2} (h_{nn}^2 - h_c^2) \end{aligned} \quad (4)$$

Discharge conservation equation

$$\begin{aligned} & h_{n\kappa} \int_0^{y_1} U dy + h_{n\kappa} U_{n\kappa} \bar{\epsilon}'_{\kappa_1} + h_{n\kappa} \int_0^{\bar{\epsilon}_n} U dy + h_{pc} \int_{\bar{\epsilon}_n}^{\bar{\epsilon}_n + \bar{\epsilon}_p} U dy + h_{pc} U_{p\kappa_1} \bar{\epsilon}_n + h_{pc} \int_0^{\bar{\epsilon}_p} U dy + h_{pc} \int_{\bar{\epsilon}_p}^{\bar{\epsilon}_p + \bar{\epsilon}_n} U dy + h_{n\kappa} U_{n\kappa} \bar{\epsilon}''_{\kappa_1} + h_{n\kappa} \int_{y_5}^{y_6} U dy = \\ & = h_{n\kappa} \int_0^{y_1} U dy + h_{n\kappa} U_{n\kappa} \bar{\epsilon}'_{\kappa_1} + h_{n\kappa} \int_0^{\bar{\epsilon}_n} U dy + h_p \int_{\bar{\epsilon}_n}^{\bar{\epsilon}_n + \bar{\epsilon}_p} U dy + h_p U_p \bar{\epsilon}_n + h_p \int_0^{\bar{\epsilon}_p} U dy + h_p \int_{\bar{\epsilon}_p}^{\bar{\epsilon}_p + \bar{\epsilon}_n} U dy + h_{nn} U_{nn} \bar{\epsilon}''_{\kappa_1} + h_{nn} \int_{y_5}^{y_6} U dy \end{aligned} \quad (5)$$

By integrating the equations we have:

$$(U_{n\kappa} - U)/(U_{n\kappa} - U_{n\kappa}) = (1 - \eta^{1,5})^2 \quad (6)$$

at section line  $K_1 - K_1$   $U_{n\kappa} = 0$

$$(U_{n\kappa} - U)/U_{n\kappa} = (1 - \eta^{1,5})^2 \quad (7)$$

In the mixing zone at section lines  $X_1 - X_1$  and  $K_1 - K_1$

$$\begin{aligned} & 0,416\bar{\epsilon}'_{\kappa_1} U_{n\kappa}^2 h_{n\kappa} + h_{n\kappa} U_{n\kappa}^2 \bar{\epsilon}'_{\kappa_1} - h_{n\kappa} U_{p\kappa_1}^2 \bar{\epsilon}'_{\kappa_1} K_1 - h_{pc} \bar{\epsilon}'_{\kappa_1} U_{p\kappa_1}^2 K_2 + h_{pc} U_{p\kappa_1}^2 \bar{\epsilon}_n + h_{pc} \bar{\epsilon}'_{\kappa_1} U_{p\kappa_1}^2 K_3 + h_{n\kappa} U_{p\kappa_1}^2 \bar{\epsilon}'_{\kappa_1} K_4 + h_{n\kappa} U_{n\kappa}^2 \bar{\epsilon}''_{\kappa_1} + \\ & + 0,416\bar{\epsilon}''_{\kappa_1} U_{n\kappa}^2 h_{n\kappa} = h_{n\kappa} U_{n\kappa}^2 \bar{\epsilon}'_{\kappa_1} (0,416 + 0,268m_n + 0,316m_n^2) + h_{n\kappa} U_{n\kappa}^2 \bar{\epsilon}'_{\kappa_1} - h_{n\kappa} U_p^2 \bar{\epsilon}'_{\kappa_1} K_5 - h_p \bar{\epsilon}'_{\kappa_1} U_p^2 K_6 + h_p U_p^2 \bar{\epsilon}_n + h_p \bar{\epsilon}'_{\kappa_1} U_p^2 K_7 + \\ & + h_{nn} U_p^2 \bar{\epsilon}'_{\kappa_1} K_8 + h_{nn} U_{nn}^2 \bar{\epsilon}''_{\kappa_1} + 0,416\bar{\epsilon}''_{\kappa_1} U_{nn}^2 h_{nn} + \frac{gB_p}{2} (h_p^2 - h_c^2) + \frac{gB_{n\kappa}}{2} (h_{n\kappa}^2 - h_c^2) + \frac{gB_{nn}}{2} (h_{nn}^2 - h_c^2) \end{aligned} \quad (10)$$

$$\begin{aligned} & 0,55\bar{\epsilon}'_{\kappa_1} U_{n\kappa} h_{n\kappa} + h_{n\kappa} U_{n\kappa} \bar{\epsilon}'_{\kappa_1} - h_{n\kappa} U_{p\kappa_1} \bar{\epsilon}'_{\kappa_1} K_9 - h_{pc} U_{p\kappa_1} \bar{\epsilon}'_{\kappa_1} K_{10} + h_{pc} U_{p\kappa_1} \bar{\epsilon}_n + h_{pc} \bar{\epsilon}'_{\kappa_1} U_{p\kappa_1} K_{11} + h_{n\kappa} U_{p\kappa_1} \bar{\epsilon}'_{\kappa_1} K_{12} + \\ & + h_{n\kappa} U_{n\kappa} \bar{\epsilon}''_{\kappa_1} + 0,55h_{n\kappa} U_{n\kappa} \bar{\epsilon}''_{\kappa_1} = h_{n\kappa} U_{n\kappa} \bar{\epsilon}'_{\kappa_1} (0,55 + 0,45m_n) + h_{n\kappa} U_{n\kappa} \bar{\epsilon}'_{\kappa_1} - h_{n\kappa} U_p \bar{\epsilon}'_{\kappa_1} K_{13} - \\ & - h_p U_p \bar{\epsilon}'_{\kappa_1} K_{14} + h_p U_p \bar{\epsilon}_n + h_p \bar{\epsilon}'_{\kappa_1} U_p K_{15} + h_{nn} U_p \bar{\epsilon}'_{\kappa_1} K_{16} + h_{nn} U_{nn} \bar{\epsilon}''_{\kappa_1} + 0,55\bar{\epsilon}''_{\kappa_1} h_{nn} U_{nn} \end{aligned} \quad (11)$$

For the given case the symbolic notations are as follows:

$$K_1 = \psi_1 + \psi_2 m_{n\kappa_1} + \psi_3 m_{n\kappa_1}^2; \quad K_2 = \psi'_1 + \psi'_2 m_{n\kappa_1} + \psi'_3 m_{n\kappa_1}^2; \quad K_3 = \psi_4 + \psi_5 m_{n\kappa_1} + \psi_6 m_{n\kappa_1}^2;$$

$$K_4 = \psi'_4 + \psi'_5 m_{n\kappa_1} + \psi'_6 m_{n\kappa_1}^2; \quad K_5 = \psi_1 + \psi_2 m_{n\kappa_1} + \psi_3 m_{n\kappa_1}^2; \quad K_6 = \psi'_1 + \psi'_2 m_{n\kappa_1} + \psi'_3 m_{n\kappa_1}^2;$$

$$K_7 = \psi_4 + \psi_5 m_{n\kappa_1} + \psi_6 m_{n\kappa_1}^2; \quad K_8 = \psi'_4 + \psi'_5 m_{n\kappa_1} + \psi'_6 m_{n\kappa_1}^2; \quad K_9 = \psi_7 + \psi_8 m_{n\kappa_1};$$

$$K_{10} = \psi'_7 + \psi'_8 m_{n\kappa_1}; \quad K_{11} = \psi_9 + \psi_{10} m_{n\kappa_1}; \quad K_{12} = \psi'_9 + \psi'_{10} m_{n\kappa_1};$$

$$K_{13} = \psi_7 + \psi_8 m_{n\kappa_1};$$

$$m_{n\kappa_1} = U_{n\kappa_1}/U_{p\kappa_1}; \quad m_{n\kappa_1} = U_{n\kappa_1}/U_{p\kappa_1}; \quad m_{n\kappa_1} = U_{n\kappa_1}/U_{p\kappa_1}; \quad m_{nn} = U_{nn}/U_p;$$

$$\psi_1 = 1,5E^4 + 0,143E^7 - 0,727E^{5,5} - 1,6E^{2,5} + E; \quad \psi'_1 = 1,5\bar{\epsilon}_p^4 - 1,6(\bar{\epsilon}_p)^{2,5} - 0,727(\bar{\epsilon}_p)^{5,5} + 0,143(\bar{\epsilon}_p)^7 + \bar{\epsilon}_p;$$

$$\psi_2 = 1,454E^{5,5} - 0,286E^7 - 2,5E^4 + 1,6E^{2,5}; \quad \psi'_2 = 1,6(\bar{\epsilon}_p) - 2,5(\bar{\epsilon}_p)^4 + 1,454(\bar{\epsilon}_p)^{5,5} - 0,286(\bar{\epsilon}_p)^7;$$

$$\psi_3 = 0,143E^7 - 0,727E^{5,5} + E^4; \quad \psi'_3 = 0,143(\bar{\epsilon}_p)^7 + (\bar{\epsilon}_p)^4 - 0,727(\bar{\epsilon}_p)^{5,5};$$

length of the analyzed region does not exceed 10÷15% of the length of vortex zone beyond the contracted section line  $L''$ . Therefore we can neglect traction force influence at short distance.

Water depth increment is taken as follows

$$h_p = h_{pc} + Ix \text{ or } h_{nn} = h_{pnc} + Ix$$

$$\text{where } \partial h/\partial x = I = h_{p6} - h_{pc}/L_{III} = \text{const. } h_{nn} = h_{nnc} + Ix \quad (3)$$

In order to solve the task we used flow momentum conservation and discharge conservation equations. Besides, we have boundary conditions for section line  $K_2 - K_2$ : restoration of the original flow condition occurs at the end of flow restoration region:  $h_p = h_{p6}$ ;  $U_p = U_{p6}$ ;  $U_{nn} = U_{nn6}$ ;  $U_{n\kappa} = U_{n\kappa6}$ .

We generate the equations for section lines  $K_1 - K_1$  and  $X_1 - X_1$ :

$$\begin{aligned}
 \psi_4 &= 1,5(\bar{\theta}_p)^4 - 1,6(\bar{\theta}_p)^{2,5} - 0,727(\bar{\theta}_p)^{5,5} + 0,143(\bar{\theta}_p)^7 + \bar{\theta}_p; & \psi'_4 &= 1,5E^4 + 0,143E^7 - 0,727E^{5,5} - 1,6E^{2,5} + E; \\
 \psi_5 &= 1,6(\bar{\theta}_p)^{2,5} - 2,5(\bar{\theta}_p)^4 + 1,454(\bar{\theta}_p)^{5,5} - 0,286(\bar{\theta}_p)^7; & \psi'_5 &= 1,454E^{5,5} - 0,286E^7 - 2,5E^4 + 1,6E^{2,5}; \\
 \psi_6 &= 0,143(\bar{\theta}_p)^7 + (\bar{\theta}_p)^4 - 0,727(\bar{\theta}_p)^{5,5}; & \psi'_6 &= 0,143E^7 - 0,727E^{5,5} + E^4; \\
 \psi_7 &= E - 0,8E^{2,5} + 0,25E^4; & \psi'_7 &= \bar{\theta}_p - 0,8(\bar{\theta}_p)^{2,5} + 0,25(\bar{\theta}_p)^4; \\
 \psi_8 &= 0,8E^{2,5} - 0,25E^4; & \psi'_8 &= 0,8(\bar{\theta}_p)^{2,5} - 0,25(\bar{\theta}_p)^4; \\
 \psi_9 &= \bar{\theta}_p - 0,8\bar{\theta}_p^{2,5} + 0,25\bar{\theta}_p^4; & \psi'_9 &= E - 0,8E^{2,5} + 0,25E^4; \\
 \psi_{10} &= 0,8\bar{\theta}_p^{2,5} - 0,25\bar{\theta}_p^4; & \psi'_{10} &= 0,8E^{2,5} - 0,25E^4; \\
 E &= 1 - \bar{\theta}_p; & \bar{\theta}_p &= \theta_p / \theta^*
 \end{aligned}$$

We divide both equations by  $\theta_0 h_{pc}$  and by carrying out some changes from (10) we get velocity change pattern for flow at channel part

$$\frac{U_p}{U_{pk_1}} = \sqrt{\frac{\bar{D}_1 - \frac{\bar{B}_p}{2Fr_{pk_1}}(\bar{h}_p - 1) - \frac{\bar{B}_a m_{n\kappa_1}^2}{2Fr_{n\kappa_1}} \bar{h}_{n\kappa} (\bar{h}_{n\kappa} - 1) - \frac{\bar{B}_n}{2Fr_{m\kappa_1}} \bar{h}_{m\kappa} (\bar{h}_{m\kappa} - 1)}{(M_4 \bar{\theta}' + \bar{\theta}'_{ял\kappa_1}) \bar{h}_{n\kappa} m_{n\kappa}^2 - M_5 \bar{\theta}^* + \bar{h}_p \bar{\theta}_\kappa + (0,416 \bar{\theta}''_{\kappa_1} + \bar{\theta}''_{ял\kappa_1}) \bar{h}_{m\kappa} m_{m\kappa}^2}} \quad (12)$$

where  $\bar{D}_1 = (0,416 \bar{\theta}'_{\kappa_1} + \bar{\theta}'_{ял\kappa_1}) \bar{h}_{n\kappa} m_{n\kappa}^2 - \bar{\theta}^* (\bar{h}_{n\kappa} K_1 + K_2 - K_3 - \bar{h}_{n\kappa} K_4) + \bar{\theta}_\kappa (0,416 \bar{\theta}''_{\kappa_1} + \bar{\theta}''_{ял\kappa_1}) \bar{h}_{m\kappa} m_{m\kappa}^2$ ;  
 $M_4 = 0,416 + 0,268 m_n + 0,316 m_n^2$ ;  
 $M_5 = \bar{h}_{n\kappa} K_5 + \bar{h}_p K_6 - \bar{h}_p K_7 - \bar{h}_{m\kappa} K_8$ ;  
 $\bar{B}_p = B_p / \theta_0$ ;  $\bar{h}_p = h_p / h_{pc}$ ;  $\bar{B}_a = B_a / \theta_0$ ;  $\bar{B}_n = B_n / \theta_0$ ;  $\bar{h}_{n\kappa} = h_{n\kappa} / h_{pc}$ ;  $\bar{h}_{n\kappa} = h_{n\kappa} / h_{pc}$ ;  $\bar{h}_{m\kappa} = h_{m\kappa} / h_{pc}$ ;  
 $\bar{h}_{m\kappa} = h_{m\kappa} / h_{pc}$ ;  $\bar{h}'_{n\kappa} = h'_{n\kappa} / h_{n\kappa}$ ;  $\bar{h}'_{m\kappa} = h'_{m\kappa} / h_{m\kappa}$ ;  $m_{n\kappa_1} = U_{n\kappa_1} / U_{pk_1}$ ;  
 $m_{m\kappa_1} = U_{m\kappa_1} / U_{pk_1}$ ;  $Fr_{pk_1} = U_{pk_1}^2 / gh_{pc}$ ;  $Fr_{n\kappa_1} = U_{n\kappa_1}^2 / gh_{n\kappa}$ ;  $Fr_{m\kappa_1} = U_{m\kappa_1}^2 / gh_{m\kappa}$ ;

As seen from the obtained relationship, velocities in channel depend on flow kinetics at the initial section line, on relative velocities at floodplains, and on channel and floodplain morphological parameters, on flow interaction zone parameters. From discharge conservation equation we have

$$\begin{aligned}
 U_{pk_1} [(0,55 \bar{\theta}'_{\kappa_1} + \bar{\theta}'_{ял\kappa_1}) \bar{h}_{n\kappa} m_{n\kappa}^2 - (\bar{h}_{n\kappa} K_9 + K_{10} - K_{11} - \bar{h}_{m\kappa} K_{12}) \bar{\theta}^* + \bar{\theta}_\kappa + (0,55 \bar{\theta}''_{\kappa_1} + \bar{\theta}''_{ял\kappa_1}) \bar{h}_{m\kappa} m_{m\kappa}^2] = \\
 = U_p [(0,55 + 0,45 m_n) \bar{\theta}' + \bar{\theta}'_{ял\kappa_1}] \bar{h}_{n\kappa} m_{n\kappa}^2 - (\bar{h}_{n\kappa} K_{13} + \bar{h}_p K_{14} - \bar{h}_p K_{15} - \bar{h}_{m\kappa} K_{16}) \bar{\theta}^* + \bar{h}_p \bar{\theta}_\kappa + (0,55 \bar{\theta}'' + \bar{\theta}''_{ял\kappa_1}) \bar{h}_{m\kappa} m_{m\kappa}^2
 \end{aligned} \quad (13)$$

By solving (10) and (11) together we get

$$A_1 m_{n\kappa}^2 + A_2 m_{m\kappa}^2 + A_3 = 0 \quad (14)$$

$$A'_1 m_{n\kappa}^2 + A'_2 m_{m\kappa}^2 + A'_3 = 0 \quad (15)$$

where

$$\begin{aligned}
 A_1 &= \bar{D}_2 C_{11}^2 \bar{h}_{n\kappa}^2 - \Phi_1^2 (M_4 \bar{\theta}' - \bar{\theta}'_{ял\kappa_1}) \bar{h}_{n\kappa}; \\
 A_2 &= 2 \bar{D}_2 \bar{h}_{n\kappa} (C_{11} \bar{h}_p \bar{\theta}_\kappa - C_{11} C_{12} \bar{\theta}^*) + 2 \bar{D}_2 C_{11} \bar{h}_{n\kappa} C_{13} \bar{h}_{m\kappa} m_{m\kappa}; \\
 A_3 &= (\bar{D}_2 C_{13}^2 \bar{h}_{m\kappa}^2 - \Phi_1^2 M_3 \bar{h}_{m\kappa}) m_{m\kappa}^2 + (C_{13} \bar{h}_p \bar{\theta}_\kappa - C_{13} C_{12} \bar{\theta}^*) 2 \bar{D}_2 \bar{h}_{m\kappa} m_{m\kappa} + (\bar{h}_p \bar{\theta}_\kappa - C_{12} \bar{\theta}^*)^2 \bar{D}_2 - \Phi_1^2 (\bar{h}_p \bar{\theta}_\kappa - M_5 \bar{\theta}^*); \\
 A'_1 &= \bar{D}_2 C_{13}^2 \bar{h}_{m\kappa}^2 - \Phi_1^2 M_3 \bar{h}_{m\kappa}; \\
 A'_2 &= (C_{13} \bar{h}_p \bar{\theta}_\kappa - C_{13} C_{12} \bar{\theta}^*) 2 \bar{D}_2 \bar{h}_{m\kappa} + 2 \bar{D}_2 C_{11} \bar{h}_{n\kappa} C_{13} \bar{h}_{m\kappa} m_{m\kappa}; \\
 A'_3 &= [\bar{D}_2 C_{11}^2 \bar{h}_{n\kappa}^2 - \Phi_1^2 (M_4 \bar{\theta}' - \bar{\theta}'_{ял\kappa_1}) \bar{h}_{n\kappa}] m_{n\kappa}^2 + (C_{11} \bar{h}_p \bar{\theta}_\kappa - C_{11} C_{12} \bar{\theta}^*) 2 \bar{D}_2 \bar{h}_{n\kappa} m_{n\kappa} + (\bar{h}_p \bar{\theta}_\kappa - C_{12} \bar{\theta}^*)^2 \bar{D}_2 - \Phi_1^2 (\bar{h}_p \bar{\theta}_\kappa - M_5 \bar{\theta}^*); \\
 \bar{D}_2 &= \bar{D}_1 - \frac{\bar{B}_p}{2Fr_{pk_1}} (\bar{h}_p - 1) - \frac{\bar{B}_a m_{n\kappa_1}^2}{2Fr_{n\kappa_1}} \bar{h}_{n\kappa} (\bar{h}_{n\kappa} - 1) - \frac{\bar{B}_n}{2Fr_{m\kappa_1}} \bar{h}_{m\kappa} (\bar{h}_{m\kappa} - 1); \\
 \Phi_1 &= (0,55 \bar{\theta}'_{\kappa_1} + \bar{\theta}'_{ял\kappa_1}) \bar{h}_{n\kappa} m_{n\kappa}^2 - (\bar{h}_{n\kappa} K_9 + K_{10} - K_{11} - \bar{h}_{m\kappa} K_{12}) \bar{\theta}^* + \bar{\theta}_\kappa + (0,55 \bar{\theta}''_{\kappa_1} + \bar{\theta}''_{ял\kappa_1}) \bar{h}_{m\kappa} m_{m\kappa}^2; \\
 C_{11} &= (0,55 + 0,45 m_n) \bar{\theta}' + \bar{\theta}'_{ял\kappa_1}; \quad C_{12} = \bar{h}_{n\kappa} K_{13} + \bar{h}_p K_{14} - \bar{h}_p K_{15} - \bar{h}_{m\kappa} K_{16}; \quad C_{13} = 0,55 \bar{\theta}'' + \bar{\theta}''_{ял\kappa_1};
 \end{aligned}$$

For the section line  $K_2 - K_2$  the following equities are true:

$$\begin{aligned}
 U_{p\theta}^2 \{ [\bar{L}_{III} (0,1M_4 - 0,1) + M_4 \bar{\theta}'_{\kappa_1} + \bar{\theta}'_{ял\kappa_1}] \bar{h}_{n\kappa} m_{n\kappa}^2 - M_5 \bar{\theta}^* + \bar{h}_p \bar{\theta}_\kappa + (0,012 \bar{L}_{III} + 0,416 \bar{\theta}''_{\kappa_1} + \bar{\theta}''_{ял\kappa_1}) \bar{h}_{m\kappa} m_{m\kappa}^2 \} = U_{pk_1}^2 \bar{D}_2 \\
 \bar{L}_{III} [(0,1M_4 - 0,1) \bar{h}_{n\kappa} m_{n\kappa}^2 + 0,012 \bar{h}_{m\kappa} m_{m\kappa}^2] + (M_4 \bar{\theta}'_{\kappa_1} + \bar{\theta}'_{ял\kappa_1}) \bar{h}_{n\kappa} m_{n\kappa}^2 - M_5 \bar{\theta}^* + \bar{h}_p \bar{\theta}_\kappa + (0,416 \bar{\theta}''_{\kappa_1} + \bar{\theta}''_{ял\kappa_1}) \bar{h}_{m\kappa} m_{m\kappa}^2 = \frac{U_{pk_1}^2}{U_{p\theta}^2} \bar{D}_2
 \end{aligned}$$

And the length of flow restoration region is

$$\bar{L}_{III} = \frac{U_{pk_1}^2 \bar{D}_2 - (M_4 \bar{\theta}'_{\kappa_1} + \bar{\theta}'_{ял\kappa_1}) \bar{h}_{n\kappa} m_{n\kappa}^2 + M_5 \bar{\theta}^* - \bar{h}_p \bar{\theta}_\kappa - (0,416 \bar{\theta}''_{\kappa_1} + \bar{\theta}''_{ял\kappa_1}) \bar{h}_{m\kappa} m_{m\kappa}^2}{(0,1M_4 - 0,1) \bar{h}_{n\kappa} m_{n\kappa}^2 + 0,012 \bar{h}_{m\kappa} m_{m\kappa}^2} \quad (16)$$

The obtained relationships include relative velocity along the left bank  $m_n$ , value that changes from 0 to 1. From the experimental research data we introduce the relationship to describe the character of these changes with the following equation

$$m_n = \frac{U_{na}}{U_{na}} = \left(\frac{x}{L_{III}}\right)^2 \quad (17)$$

#### Conclusions:

The analysis of the obtained relationships show, that in this case the task also remains undefined at some degree. There are three unknowns  $U_p$ ,  $U_{na}$ ,  $U_{nn}$  in two equations (12) и (14,15) три неизвестных величин  $U_p$ ,  $U_{na}$ ,  $U_{nn}$ , therefore the task is solved by

gradual approximation. It is known that these values between the section lines  $K_1-K_1$  and  $K_2-K_2$  decrease from  $U_{pk}$ ,  $U_{nka}$ ,  $U_{nmk}$  to  $V_{p6}$ ,  $V_{na}$ ,  $V_{nn}$ .

Knowing this we must give values for  $m_{na}$  or  $m_{nn}$  and using equation (14,15) determine  $m_{nn}$  or  $m_{na}$  and further determine  $U_p$  with equation (12).

From the obtained values using discharge conservation equation (11) we equate the left and the right parts of the equation. In case if the condition is not satisfied, the calculation is carried out again.

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## Hydraulic parameters of flow bilaterally constrained by transverse floodplain dams in the region of its spreading

**Abstract:** Using main equations of hydro mechanics, equation of momentum conservation and discharge conservation specifically, the authors of the article introduce design relationships for determining main parameters of flow bilaterally constrained by transverse floodplain dams in the region of its spreading.

The task differs from previous ones by the presence of bilateral floodplain, two zones of interaction between channel and floodplain flows, different roughness at floodplain and in the channel.

**Keywords:** floodplain, channel, transverse blank dams, interaction zone of floodplain and channel flow, turbulent mixing zone, region of flow spreading, traction forces, velocity in channel, velocity at floodplain, length of region of flow spreading.

The role of floodplains for national economy has grown significantly in recent years. First of all, it is determined by their agricultural use and also by urban development in floodplains. Floodplains can give high yields due to their close location to riverbanks. Exploitation of floodplains is often carried out by using transverse solid dams as protection, and these dams are built of the same soil from the floodplain.

Designing transverse dams in rivers with floodplain has its special features as complex morphology, kinematic and dynamic interaction of riverbank and floodplain flows [1]. The work [2] discusses design issues for transverse dams in rivers with single-side floodplain and the influence of partial land use between dams [3] under one sided obstruction.

The given work discusses design issues for transverse dams, symmetrically obstructing flow. The task differs from the previous works by the presence of bilateral floodplain, two zones of inter-

action between riverbank and floodplain flows, various roughness measures at the right and left floodplains, differing from those in riverbank.

The experiments have been held in schematic riverbanks with bilateral symmetrical floodplains. The experiments showed that when the flow fills the whole floodplain, the riverbank roughness, the roughness of the left and the right floodplain differ from each other.

The research result analyses show that there is significant deformation in flow depth and velocity regime, also formation of backwater takes place in head race, flow compression and spreading and natural flow restoration areas in the tailrace (pic.1.).

The velocities increase both in main riverbank and in floodplain area of flow. Flow spreading and restoration of natural flow restoration area form after compressed section.

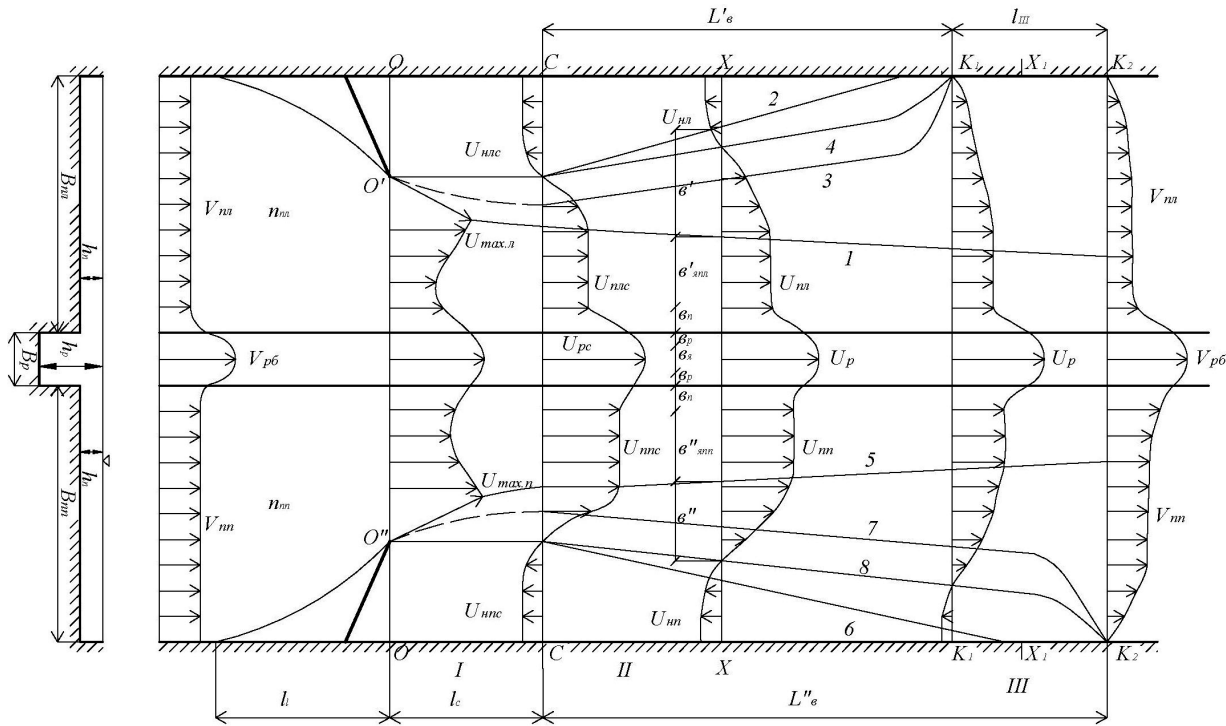


Figure 1. Asymmetrical flow s2 preading scheme for  $(n_{na} \neq n_{nm})$

Velocity distribution in the riverbank and floodplain flow interaction zones both for natural riverbank and for deformed flow depend on earlier obtained relationships [2]. Interaction zone width depend on relationship of depth for riverbank and floodplain [1; 2; 4; 5].

The velocity fields also undergo significant changes compared to natural flow. In the backwater area the velocities increase close to obstruction section. Behind the obstruction point there takes place planned and vertical flow compression. The velocity distribution by the flow width has significant transverse gradients exactly in compression area.

The velocities increase both in main riverbank and in floodplain area of flow. Flow spreading and restoration of natural flow restoration area form after compressed section.

Velocity distribution in the riverbank and floodplain flow interaction zones both for natural riverbank and for deformed flow depend on the following relationship:

$$\frac{U - U_{nx}}{U_{px} - U_{nx}} = (1 - \eta^{3/2})^2 \quad (1)$$

where  $\eta = \frac{\epsilon^* - Y}{\epsilon^*}$ ;  $Y$  – ordinate of the point where  $U$  is determined;

$U_{px}, U_{nx}$  – velocities in channel and at floodplain;

$\epsilon^*$  – the width of interaction zone  $\epsilon^* = \epsilon_p + \epsilon_n$

Interaction zone width comply with the relationship of depth for riverbank and floodplain [1; 2; 4; 5].

$$\frac{\epsilon^*}{h_n} = 2,4 \cdot \frac{h_p}{h_n} - 2,4 \quad (2)$$

$$\frac{\epsilon_p}{h_n} = 1,4 \cdot \frac{h_p}{h_n} - 1,4 \quad (3)$$

$$\frac{\epsilon_n}{h_n} = \frac{h_p}{h_n} - 1 \quad (4)$$

The nature of flow velocity distribution beyond the obstructed section are close to those accepted in the theory of turbulent flow,

distributed in confined space [6]. Therefore, the flow is considered as if it consists of hydraulically homogenous zones: a) weakly disturbed core in riverbank and floodplain with small transverse gradients; b) turbulent mixing with significant velocity gradients at both floodplain parts; c) interaction of riverbank and floodplain flows; d) back flow in protected banks.

Versatility of velocity fields in turbulent mixing zones, which depend on Shlihting-Abramovich relationship [6] has been proven experimentally. The distinctive feature of the problem is in formation of two zones of intensive turbulent mixing

— the first one forms between beams  $O^*1$  and  $O^*2$  with width  $\epsilon'$ ;

— the second one forms between beams  $O^*1$  and  $O^*2$  with width  $\epsilon''$ .

Velocity distribution in the first zone complies with the following relationship:

$$\frac{U_{na} - U}{U_{na} - U_{na}} = (1 - \eta^{3/2})^2 \text{ where } \eta = \frac{y - y_2}{\epsilon'} \quad (5)$$

in the second (right) zone:

$$\frac{U_{nm} - U}{U_{nm} - U_{nm}} = (1 - \eta^{3/2})^2 \text{ where } \eta = \frac{y - y_2}{\epsilon''} \quad (6)$$

$U_{na}, U_{nm}$  – velocities at left and right floodplains;

$U_{na}, U_{nm}$  – inverse velocities at floodplains.

Within the research (symmetrical obstruction and symmetrical floodplains) the following schemes are reviewed: a) when roughness of the right and left sides of the floodplain is the same, the flow spreads symmetrically; b) when the roughness differs, the flow spreads asymmetrically (pic.1).

In the second case the lengths of whirlpool zones are different and the velocity field restoration area generates there.

In both schemes laws for the velocity change in riverbank, floodplains, backflow, lengths of whirlpool zones should have been set.

In order to solve the task the equations for law of conservation of momentum, conservation of discharge, written for section lines  $C-C$  and  $X-X$  and some boundary conditions were used.

Momentum conservation equation

$$\begin{aligned}
 & \rho h_{nnc} U_{nnc}^2 (B_{nnc} - \epsilon'_c - \epsilon'_{яnnc} - \epsilon_n) + \rho h_{nnc} \int_{y_2}^{y_1} U^2 dy + \rho h_{nnc} U_{nnc}^2 \epsilon'_{яnnc} + \rho h_{nnc} \int_0^{\epsilon_n} U^2 dy + \rho h_{pc} \int_{\epsilon_n}^{\epsilon_n + \epsilon_p} U^2 dy + \\
 & + \rho h_{pc} U_{pc}^2 \epsilon_{яc} + \rho h_{pc} \int_0^{\epsilon_p} U^2 dy + \rho h_{nnc} \int_{\epsilon_p}^{\epsilon_p + \epsilon_n} U^2 dy + \rho h_{nnc} U_{nnc}^2 \epsilon''_{яnn} + \rho h_{nnc} \int_{y_5}^{y_6} U^2 dy + \rho h_{nnc} U_{nnc}^2 (B_{nnc} - \\
 & \epsilon'' - \epsilon''_{яnnc} - \epsilon_n) = \rho h_{nnc} U_{nnc}^2 (B_{nnc} - \epsilon'_c - \epsilon'_{яnnc} - \epsilon_n) + \rho h_{nnc} \int_{y_2}^{y_1} U^2 dy + \rho h_{nnc} U_{nnc}^2 \epsilon'_{яnnc} + \rho h_{nnc} \int_0^{\epsilon_n} U^2 dy + \\
 & + \rho h_p \int_{\epsilon_n}^{\epsilon_n + \epsilon_p} U^2 dy + \rho h_p U_p^2 \epsilon_{яp} + \rho h_p \int_0^{\epsilon_p} U^2 dy + \rho h_n \int_{\epsilon_p}^{\epsilon_p + \epsilon_n} U^2 dy + \rho h_{nn} U_{nn}^2 \epsilon''_{яnn} + \rho h_{nn} \int_{y_5}^{y_6} U^2 dy + \\
 & \rho h_{nn} U_{nn}^2 (B_{nn} - \epsilon'' - \epsilon''_{яnn} - \epsilon_n) + \rho \int_0^x \int_0^{B_{nnc}} \frac{\lambda_{nnc}}{2} U^2 dy dx + \rho \int_0^x \int_0^{B_p} \frac{\lambda_p}{2} U^2 dy dx + \rho \int_0^x \int_0^{B_{nn}} \frac{\lambda_{nn}}{2} U^2 dy dx
 \end{aligned} \quad (7)$$

Discharge conservation equation

$$\begin{aligned}
 & h_{nnc} U'_{nnc} (B_{nnc} - \epsilon'_c - \epsilon'_{яnnc} - \epsilon_n) + h_{nnc} \int_{y_2}^{y_1} U dy + h_{nnc} U_{nnc} \epsilon'_{яnnc} + h_{nnc} \int_0^{\epsilon_n} U dy + h_{pc} \int_{\epsilon_n}^{\epsilon_n + \epsilon_p} U dy + h_{pc} U_{pc} \epsilon_{яc} + \\
 & + h_{pc} \int_0^{\epsilon_p} U dy + h_{nnc} \int_{\epsilon_p}^{\epsilon_p + \epsilon_n} U dy + h_{nnc} U_{nnc} \epsilon''_{яnn} + h_{nnc} \int_{y_5}^{y_6} U dy + h_{nnc} U_{nnc} (B_{nnc} - \epsilon'' - \epsilon''_{яnnc} - \epsilon_n) = \\
 & = h_{nnc} U_{nnc} (B_{nnc} - \epsilon'_c - \epsilon'_{яnnc} - \epsilon_n) + h_{nnc} \int_{y_2}^{y_1} U dy + h_{nnc} U_{nnc} \epsilon'_{яnnc} + h_{nnc} \int_0^{\epsilon_n} U dy + h_p \int_{\epsilon_n}^{\epsilon_n + \epsilon_p} U dy + h_p U_p \epsilon_{яp} + \\
 & + h_p \int_0^{\epsilon_p} U dy + h_n \int_{\epsilon_p}^{\epsilon_p + \epsilon_n} U dy + h_{nn} U_{nn} \epsilon''_{яnn} + h_{nn} \int_{y_5}^{y_6} U dy + h_{nn} U_{nn}^2 (B_{nn} - \epsilon'' - \epsilon''_{яnn} - \epsilon_n)
 \end{aligned} \quad (8)$$

Integration of equations (7, 8) are carried out by accounting (1,2,3,4,5,6) with condition  $U_n = 0$  [3, 5], and traction forces are computed by mean depth and velocities at flow spreading region

$$\begin{aligned}
 h_n &= h_{nc}; h_p = h_{pc}; V_{nnc}^* = \frac{U_{nnc} + V_{nnc} \bar{\alpha}}{2}; V_{nn}^* = \frac{U_{nnc} + V_{nnc} \bar{\alpha}}{2}; \\
 V_p^* &= \frac{U_{pc} + V_{pc} \bar{\alpha}}{2}; \bar{V}_{nnc} = \frac{V_{nnc}^*}{U_{pc}}; \bar{V}_{nn} = \frac{V_{nn}^*}{U_{pc}}
 \end{aligned}$$

We determine the velocity in channel from (7)

$$\begin{aligned}
 \frac{U_p}{U_{pc}} &= \sqrt{\frac{(0,416 \bar{\epsilon}'_c \bar{h}_{nnc} + \bar{h}_{nnc} \bar{\epsilon}_{яnnc}) m_{nnc}^2 - \bar{\epsilon}^* (\bar{h}_{nnc} K_1 + K_2 - K_3 - \bar{h}_{nnc} K_4) + \bar{\epsilon}_{яc} + (\bar{\epsilon}''_{яnnc} + \\
 & (0,416 \bar{\epsilon}' + \bar{\epsilon}'_{яnnc}) \bar{h}_{nnc} m_{nnc}^2 - \bar{\epsilon}^* (\bar{h}_n K_5 + K_6 - K_7 - \bar{h}_{nnc} K_8) + \bar{\epsilon}_{яp} + \\
 & + 0,416 \bar{\epsilon}''_c \bar{h}_{nnc} m_{nnc}^2 - \frac{a_{nnc} \bar{\xi}}{2} \bar{h}_{nnc} \bar{V}_{nnc}^2 - \frac{a_p \bar{\xi}}{2} \bar{V}_p^2 - \frac{a_{nn} \bar{\xi}}{2} \bar{h}_{nnc} \bar{V}_{nn}^2}{(\bar{\epsilon}''_{яnnc} + 0,416 \bar{\epsilon}''_c) \bar{h}_{nnc} m_{nnc}^2}} \quad (9)
 \end{aligned}$$

Jointly solving (7 and 8) we get equations for determining velocities — at the left floodplain

$$A_1 m_{nnc}^2 + A_2 m_{nnc} + A_3 = 0 \quad (10)$$

where

$$\begin{aligned}
 A_1 &= \mathcal{D}_1 \bar{h}_{nnc} C_7^2 - \Phi^2 M_2 \bar{h}_{nnc}; A_2 = 2 \mathcal{D}_1 \bar{h}_{nnc} C_7^2 m_{nnc} C_8 + 2 \mathcal{D}_1 \bar{h}_{nnc} C_7 (\bar{\epsilon}_{яp} - \bar{\epsilon}^* C_9); \\
 A_3 &= 2 \mathcal{D}_1 \bar{h}_{nnc} C_8 (\bar{\epsilon}_{яp} - \bar{\epsilon}^* C_9) m_{nnc} - \Phi^2 M_3 \bar{h}_{nnc} m_{nnc}^2 + \mathcal{D}_1 \bar{h}_{nnc} C_8^2 m_{nnc}^2 - \Phi^2 M_1 + \mathcal{D}_1 (\bar{\epsilon}_{яp} - \bar{\epsilon}^* C_9)^2.
 \end{aligned} \quad \text{— at the right floodplain}$$

$$A_4 m_{nn}^2 + A_5 m_{nn} + A_6 = 0 \quad (11)$$

where

$$\begin{aligned}
 A_4 &= \mathcal{D}_1 \bar{h}_{nnc} C_8^2 - \Phi^2 M_3 \bar{h}_{nnc}; A_5 = 2 \mathcal{D}_1 \bar{h}_{nnc} C_7 C_8 m_{nnc} + 2 \mathcal{D}_1 \bar{h}_{nnc} C_8 (\bar{\epsilon}_{яp} + \bar{\epsilon}^* C_9); \\
 A_6 &= (\mathcal{D}_1 \bar{h}_{nnc} C_7^2 - \Phi^2 M_2 \bar{h}_{nnc}) m_{nnc}^2 + 2 \mathcal{D}_1 \bar{h}_{nnc} C_7 (\bar{\epsilon}_{яp} - \bar{\epsilon}^* C_9) m_{nnc} + \mathcal{D}_1 (\bar{\epsilon}_{яp} - \bar{\epsilon}^* C_9)^2 - \Phi^2 M_1 \\
 \mathcal{D}_1 &= (0,416 \bar{\epsilon}'_c \bar{h}_{nnc} + \bar{h}_{nnc} \bar{\epsilon}_{яnnc}) m_{nnc}^2 - \bar{\epsilon}^* (\bar{h}_{nnc} K_1 + \bar{\epsilon} K_2 - K_3 - \bar{h}_{nnc} K_4) + \bar{\epsilon}_{яc} + \\
 & + (\bar{\epsilon}''_{яnnc} + 0,416 \bar{\epsilon}''_c) \bar{h}_{nnc} m_{nnc}^2 - \frac{a_{nnc} \bar{\xi}}{2} \bar{h}_{nnc} \bar{V}_{nnc}^2 - \frac{a_p \bar{\xi}}{2} \bar{V}_p^2 - \frac{a_{nn} \bar{\xi}}{2} \bar{h}_{nnc} \bar{V}_{nn}^2 \\
 \Phi &= (0,55 \bar{\epsilon}'_c + \bar{\epsilon}_{яnnc}) \bar{h}_{nnc} m_{nnc} - \bar{\epsilon}^* (\bar{h}_{nnc} K_9 + \bar{\epsilon} K_{10} - K_{11} - \bar{h}_{nnc} K_{12}) + \bar{\epsilon}_{яc} + (\bar{\epsilon}''_{яnnc} + 0,55 \bar{\epsilon}''_c) \bar{h}_{nnc} m_{nnc} \\
 M_1 &= \bar{\epsilon}_{яp} - \bar{\epsilon}^* (\bar{h}_n K_5 + K_6 - K_7 - \bar{h}_n K_8); M_2 = 0,416 \bar{\epsilon}' + \bar{\epsilon}'_{яnnc}; M_3 = 0,416 \bar{\epsilon}'' + \bar{\epsilon}''_{яnnc}; \\
 C_7 &= 0,55 \bar{\epsilon}' + \bar{\epsilon}'_{яnnc}; C_8 = 0,55 \bar{\epsilon}'' + \bar{\epsilon}''_{яnnc}; C_9 = \bar{h}_{nnc} K_9 + \bar{\epsilon} K_{10} - K_{11} - \bar{h}_{nnc} K_{12};
 \end{aligned}$$

$$\begin{aligned}
 K_1 &= \psi_1 + \psi_2 m_{nnc} + \psi_3 m_{nnc}^2; \\
 K_2 &= \psi_1' + \psi_2' m_{nnc} + \psi_3' m_{nnc}^2; \\
 K_3 &= \psi_4 + \psi_5 m_{nnc} + \psi_6 m_{nnc}^2; \\
 K_4 &= \psi_4' + \psi_5' m_{nnc} + \psi_6' m_{nnc}^2; \\
 K_5 &= \psi_1 + \psi_2 m_{nn} + \psi_3 m_{nn}^2; \\
 K_6 &= \psi_1' + \psi_2' m_{nn} + \psi_3' m_{nn}^2; \\
 K_7 &= \psi_4 + \psi_5 m_{nn} + \psi_6 m_{nn}^2; \\
 K_8 &= \psi_4' + \psi_5' m_{nn} + \psi_6' m_{nn}^2; \\
 \psi_1 &= 1,5E^4 + 0,143E^7 - 0,727E^{5,5} - 1,6E^{2,5} + E; \\
 \psi_2 &= 1,454E^{5,5} - 0,286E^7 - 2,5E^4 + 1,6E; \\
 \psi_3 &= 0,143E^7 - 0,727E^{5,5} + E^4; \\
 \psi_4 &= 1,5(\bar{\epsilon}_p)^4 - 1,6(\bar{\epsilon}_p)^{2,5} - 0,727(\bar{\epsilon}_p)^{5,5} + 0,143(\bar{\epsilon}_p)^7 + \bar{\epsilon}_p; \\
 \psi_5 &= 1,6(\bar{\epsilon}_p)^{2,5} - 2,5(\bar{\epsilon}_p)^4 + 1,454(\bar{\epsilon}_p)^{5,5} - 0,286(\bar{\epsilon}_p)^7; \\
 \psi_6 &= 0,143(\bar{\epsilon}_p)^7 + (\bar{\epsilon}_p)^4 - 0,727(\bar{\epsilon}_p)^{5,5}; \\
 \psi_7 &= E - 0,8E^{2,5} + 0,25E^4; \\
 \psi_8 &= 0,8E^{2,5} - 0,25E^4; \\
 \psi_9 &= \bar{\epsilon}_p - 0,8\bar{\epsilon}_p^{2,5} + 0,25\bar{\epsilon}_p^4; \\
 \psi_{10} &= 0,8\bar{\epsilon}_p^{2,5} - 0,25\bar{\epsilon}_p^4;
 \end{aligned}$$

$$E = (1 - \bar{\epsilon}_p); m_{nnc} = U_{nnc}/U_{pc}; m_{nn} = U_{nn}/U_p; a_{nn} = \frac{\lambda_{nn} B'_{nn}}{h_{nn}}; a_{nn} = \frac{\lambda_{nn} B'_{nn}}{h_{nn}}; a_p = \frac{\lambda_p B_p}{h_p}; \xi = \frac{x}{\epsilon_0};$$

At the end of large vortex zone

$$\begin{aligned}
 U_p &= U_{p\phi}; U_{nn} = V_{nn}; U_{nnc} = V_{nnc}; \xi = \frac{x}{\epsilon_0} = \frac{L''}{\epsilon_0} = \bar{L}''; x = L''; \\
 h_n &= h_{n\phi}; h_p = h_{p\phi}; m_{nnc} = V_{nnc}/U_{p\phi}; m_{nn} = V_{nn}/U_{p\phi}; \quad (11) \\
 \bar{h}_{n\phi} &= \bar{h}_{n\phi}/h_{pc}; \bar{\epsilon}_{nnc} = 0; \bar{\epsilon}' = \bar{B}_{nnc} - \bar{\epsilon}_n; \bar{\epsilon}_{nnc} = 0; \bar{\epsilon}'' = \bar{B}_{nn} - \bar{\epsilon}_n
 \end{aligned}$$

Taking into consideration boundary conditions and from the flow momentum conservation equation we get the relationship for determining the length of the large vortex zone

$$\bar{L}''_a = \frac{D'_1 - \frac{U_{p\phi}^2}{U_{pc}^2} C_{10}}{\frac{a_{nnc}}{2} \bar{h}_{n\phi} V_{nnc}^{*2} + \frac{a_p V_p^{*2}}{2} + \frac{a_{nn}}{2} \bar{h}_{n\phi} V_{nn}^{*2}} \quad (12)$$

where

$$\begin{aligned}
 C_{10} &= 0,416(\bar{B}_{nnc} - \bar{\epsilon}_n) \bar{h}_{n\phi} m_{nnc}^2 + \bar{\epsilon}_n - \\
 &- \bar{\epsilon}'' (\bar{h}_{n\phi} K_5 + K_6 - K_7 - \bar{h}_{n\phi} K_8) + 0,416(\bar{B}_{nn} - \bar{\epsilon}_n) \bar{h}_{p\phi} m_{nn}^2 \\
 D'_1 &= (0,416\bar{\epsilon}'_c \bar{h}_{nc} + \bar{h}_{nc} \bar{\epsilon}_{nnc}) m_{nnc}^2 + \bar{\epsilon}_{nc} - \\
 &- \bar{\epsilon}'' (\bar{h}_{nc} K_1 + \bar{\epsilon}'' K_2 - K_3 - \bar{h}_{nc} K_4) + (\bar{\epsilon}''_{nnc} + 0,416\bar{\epsilon}''_c) \bar{h}_{nc} m_{nnc}^2 \\
 m_{nnc} &= U_{nnc}/U_{pc}; m_{nn} = U_{nn}/U_{pc}.
 \end{aligned}$$

As seen from the obtained equations, there are three unknowns in them,  $m_{nnc}$ ,  $m_{nn}$ , and  $U_p$ , therefore the task stays undetermined to some extent.

$$\begin{aligned}
 K_9 &= \psi_7 + \psi_8 m_{nnc}; \\
 K_{10} &= \psi_7' + \psi_8' m_{nnc}; \\
 K_{11} &= \psi_9 + \psi_{10} m_{nnc}; \\
 K_{12} &= \psi_9' + \psi_{10}' m_{nnc}; \\
 K_{13} &= \psi_7 + \psi_8 m_{nn}; \\
 K_{14} &= \psi_7' + \psi_8' m_{nn}; \\
 K_{15} &= \psi_9 + \psi_{10} m_{nn}; \\
 K_{16} &= \psi_9' + \psi_{10}' m_{nn}. \\
 \psi_1' &= 1,5(\bar{\epsilon}_p)^4 - 1,6(\bar{\epsilon}_p)^{2,5} - 0,727(\bar{\epsilon}_p)^{5,5} + 0,143(\bar{\epsilon}_p)^7 + \bar{\epsilon}_p; \\
 \psi_2' &= 1,6(\bar{\epsilon}_p)^{2,5} - 2,5(\bar{\epsilon}_p)^4 + 1,454(\bar{\epsilon}_p)^{5,5} - 0,286(\bar{\epsilon}_p)^7; \\
 \psi_3' &= 0,143(\bar{\epsilon}_p)^7 + (\bar{\epsilon}_p)^4 - 0,727(\bar{\epsilon}_p)^{5,5}; \\
 \psi_4' &= 1,5E^4 + 0,143E^7 - 0,727E^{5,5} - 1,6E^{2,5} + E; \\
 \psi_5' &= 1,454E^{5,5} - 0,286E^7 - 2,5E^4 + 1,6E^{2,5}; \\
 \psi_6' &= 0,143E^7 - 0,727E^{5,5} + E^4; \\
 \psi_7' &= \bar{\epsilon}_p - 0,8(\bar{\epsilon}_p)^{2,5} + 0,25(\bar{\epsilon}_p)^4; \\
 \psi_8' &= 0,8(\bar{\epsilon}_p)^{2,5} - 0,25(\bar{\epsilon}_p)^4; \\
 \psi_9' &= E - 0,8E^{2,5} + 0,25E^4; \\
 \psi_{10}' &= 0,8E^{2,5} - 0,25E^4;
 \end{aligned}$$

In order to get over the difficulty, gradual approximation method is proposed to solve the task.

1) With the assumption, that both floodplains have the same roughness  $n_{nn} = n_{nn} = n_n$  velocity is determined at right plain (where roughness is smaller, pic 1) from the relationship (11).

2) The velocity at the left floodplain is determined from (10).

3) From the discharge consistency condition (8) at constrained section and design section lines (the parity of right and left parts of the equation must be carried out),  $U_{nnc}$  is specified. It is obvious if  $n_{nn} > n_{nn}$  or  $\lambda_{nn} > \lambda_{nn}$ , then  $U_{nnc} < U_{nn}$  or vice-versa  $n_{nn} > n_{nn}$  or  $\lambda_{nn} > \lambda_{nn}$ , then  $U_{nn} < U_{nnc}$ .

4) With the condition that  $n_{nn} = n_{nn} = n_n$  and from (12), initially the length of the large vortex zone is determined for smaller value of  $\lambda$ , and the length of small vortex zone is determined for the larger value of  $\lambda$ .

5) The length of the large vortex zone is specified by (12).

### Conclusion

1) The obtained relationships allow for determination of velocity fields, which lets to forecast possible channel and floodplain reformations after erecting structures.

2) Kinematic and geometric flow parameters depend on velocity fields in initial cross-section, relative velocities in floodplains, roughness, floodplain and riverbank morphometry, riverbank and floodplain flow interaction zone parameters, transverse dam parameters.

3) Knowing the lengths of vortex zones, we can set distances between structure in the system.

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## The spectral characteristics of the new functional materials based on a single device spatial field

**Abstract:** This article is devoted to the theory of a single spatial field, the objective existence of which is established on the basis of the interaction of electrical, magnetic and gravitational forces has been developed multifunction installation of a single spatial field.

**Keywords:** devices, magnetic fields, electric fields, gravitational fields.

The aim of this work is the analysis of the experimental data on the basis of a single device of the spatial field (SDSF), and identifying opportunities for its use for new functional materials [1, 75].

Dispersion of solids (dry milling) into a special branch of science of technology. It deals with the mechanical strength required for the destruction of the structure and the structure of solids, as well as research and design of crushers, mills and similar facilities for rational grinding [2, 212].

Results grinding evaluate changes grading curve, an increase in the specific surface of the material.

The quality of these units is evaluated by comparing required to create new surface energy and operating costs. Resulting in the production of artificial stone, the quality of the structure of materials require optimal fineness.

Dispersion solids — of grinding to small particles is carried out

to enhance the rate of heterogeneous processes. In the process of dispersing discernible two main stages: the destruction of the particles by an external force and aggregation of particles such as spontaneous or caused by external compressive and tensile forces [3, 143].

Along with dispersing and aggregation during milling changes the crystal structure and energy state of the surface layers of particles. Their study presents grinding.

Due to the high cost and energy intensive fine grinding using the existing facilities have been designed with the device SDSF allowing dispersion material dispersion 500 microns to 1,5 microns.

The device is a single spatial field, based on the four fundamental interactions, and thus on the interactions of four types of fields: gravitational, electromagnetic, magnetostatic, electric (Fig.1).

External fields create compressive or tensile forces that result in fracture and particulate materials [4, 11].



Figure 1. Industrial plant SDSF

As known cement is represented as the percentage of the oxides CaO, SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>. The quality of the cement is given by:

$$\frac{CaO}{SiO_2 + Al_2O_3 + Fe_2O_3} \quad (1)$$

Cement — Ashes passed through SDSF improves quality, increases its brand. Type of cement — ash by adding — modifier obtained from 700 to 1150.

When extracting metals from minerals should stick technique which consists in that, when aligning process, when the amount supplied to the actuator material is characterized by the quantity and quality of effluent material. If you know how much material is in the working organ, you can set time of the material to the working body of the velocity of the material:

$$t = \frac{V}{Q}, \quad (2)$$

$$v = \frac{e}{t} = \frac{lQ}{t}, \quad (3)$$

$V$  — the volume of the material of the working body,  $\mu^3$ ;

$Q_s$  — volumetric throughput, in a solid phase,  $\mu^3/s$ .

$t$  — the working time of the material body, s.

Volumetric efficiency of heavy metals in the mineral class size  $q_H$  can be determined by the formula.

$$q_H = \frac{Q_{TB} \cdot a \alpha_T}{100 \cdot 100 \delta_T}, \quad (4)$$

where in  $a$  — the content (yield) of the class size in the solid phase, %;

$\alpha_h$  — content of heavy metals in the mineral, %;

$\delta_H$  — density of the heavy metals.

Volume performance light metal of the same class size:

$$q_H = \frac{Q_H \cdot a(100 - \alpha_h)}{100 \cdot 100 \delta_h}, \quad (5)$$

where  $\delta_l$  — density of light metals volumetric efficiency class size would be:

$$q = q_H + q_l \quad (6)$$

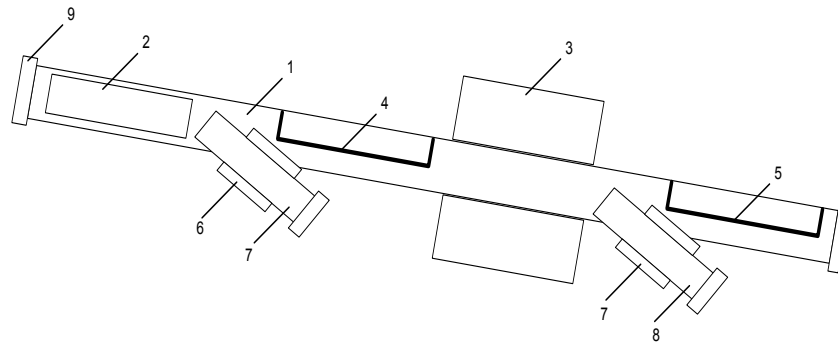


Figure 2. Block diagram SDSF

The dry material from the hopper is fed through a calibrated nozzle providing enough uniform dosage material by weight.

Deviations between the velocity of the dry material from the hopper to the channel and at the end of the pipe does not exceed 3%.

Milling minerals and extraction of heavy and light metal occurs due to the interaction of several fields: pulse (longitudinal, transverse) electromagnetic (2) and (3), pulsed electrical (terminals 4; 5) and magnetic (4) and (5) and gravity.

SDSF device based on the behavior of ferromagnetic materials, ferromagnets, antiferromagnets, diamagnetic and paramagnetic materials in external electromagnetic fields.

Our proposed design relates to the production of functional materials with new properties.

Performance Tools:

$$Q_{HM} = Q_H + Q_L, \quad (7)$$

where

$$Q_{HM} = \frac{Q \cdot \alpha}{100 \delta_H}, \quad Q_L = \frac{Q(100 - \alpha)}{100 \delta_L}, \quad (8)$$

The amount of heavy metals:

$$v_T = \frac{GB\beta_H}{100 \cdot 100 \cdot \delta_H}, \quad (9)$$

wherein  $G$  — the weight of the solid phase.

$\beta_h$  — heavy metal content, %;

$B$  — the content (yield) of solid.

The amount of light metals:

$$V_l = \frac{GB(100 - \beta_h)}{100 \cdot 100 \cdot \delta_L}. \quad (10)$$

The amount of general solid phase.

$$V = V_H + V_L \quad (11)$$

The average speed of the mineral in the body of work we find the supply:

$$v = \frac{K\alpha\delta_L + K(100 - \alpha)\delta_H}{G\beta\delta_L + G(100 - \beta)\delta_H}. \quad (12)$$

Block diagram of the proposed device (SDSF) for crushing and extraction of minerals, metals of different densities is shown in Fig. 2.

The working body of the device is SDSF fiberglass pipe diameters of 200 mm and a length in meters.

The pipe has two spur with a diameter of 100mm. Coil mounted on the pipe 2 (the longitudinal electromagnetic field) and the coil 3 (with transverse electromagnetic field) inside the tube has two copper rod with a diameter of 20 mm.

Two spurs are electromagnets. The working body 180° is tilted at an angle to the horizon. To ensure the bulk material in suspension is created inside the tube fluidized bed. The velocity of the bulk material 0,8–1m/s.

The device comprises a control system to regulate the duration and frequency of pulses for fine dispersion materials.

Get in the recent intensive development of the production of quality construction mixtures, putties, paint caused reset to agents of various designs for crushing cases, materials.

The proposed device allows to receive fine materials from 1 to 4mkm uniform structures that are trapped by the cyclone.

SDSF saves energy, so for performance 10t per hour, consumed 36kvt. hour of electricity. The device operates at a voltage of 80V and a current of 300A, a frequency of 25 Hz to 30 kHz.

This device allows you to increase the grade of cement, kaolin remove iron, silicon, crystal water, micro spheres are obtained from fly ash, dolomite to cut, remove alumina from coal increases the calorific value of the coal.



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## Calculation of optical-geometrical characteristics of parabolic-cylindrical mirror concentrating systems

**Abstract:** The paper identifies the main optical and geometric characteristics of parabolic-cylindrical mirror concentrating systems (MCSs) of energy purposes, taking into account the characteristics of attainable manufacturing modern MCS.

**Keywords:** mirror concentrating systems, parabolic-cylindrical, concentrator, focus, optical power parameters.

It is known that the solar concentrators are constructed on the basis of composite reflective elements — facets. The geometry of the concentrator to the spot of is a parabolic and for linear focus — parabolic -cylindrical. The geometry of the facets may differ from the estimated concentrator's geometry. Introduction to the geometric method of concentrator inaccuracies reduces the problem of calculating faceted concentrator to the calculation of solid MCS. In addition to the energy-power devices MCS provides the highest efficiency of solar energy conversion. Therefore, the calculation of optical-geometrical parameters parabolic-cylindrical concentrators, as well as to determine the optimal size of radial surface of the receiver is an actual problem [1–3].

The degree of concentration optimal MCS values for converting solar energy into other forms of energy used in practical computed as follows.

To calculate the energy distribution in the focal zone parabolic-cylindrical MCS trajectory of the incident and reflected rays of the Sun is seen as a set of countless individual elementary beams based on the vertices of the point system reflecting surface. These sunlight beams having an elliptical cone shape, called elementary mappings. The rays, which are on the outer surface of the cone, called marginal rays and the angle between the two — the angular size of the unit display. Thus, the elementary display size depends on the size of the solar disk, the actual distance to the sun, that is, the visible angular size (Earth  $2\gamma_0 = 32$  'arc min.) As well as the reflectivity, manufacturing precision reflector geometry and in aggregate form Sun's image. Real image dimensions are different from  $R_c$  and determined based on Figure 1.

Dimensions of real spots scattering parabolic-cylindrical MCS.

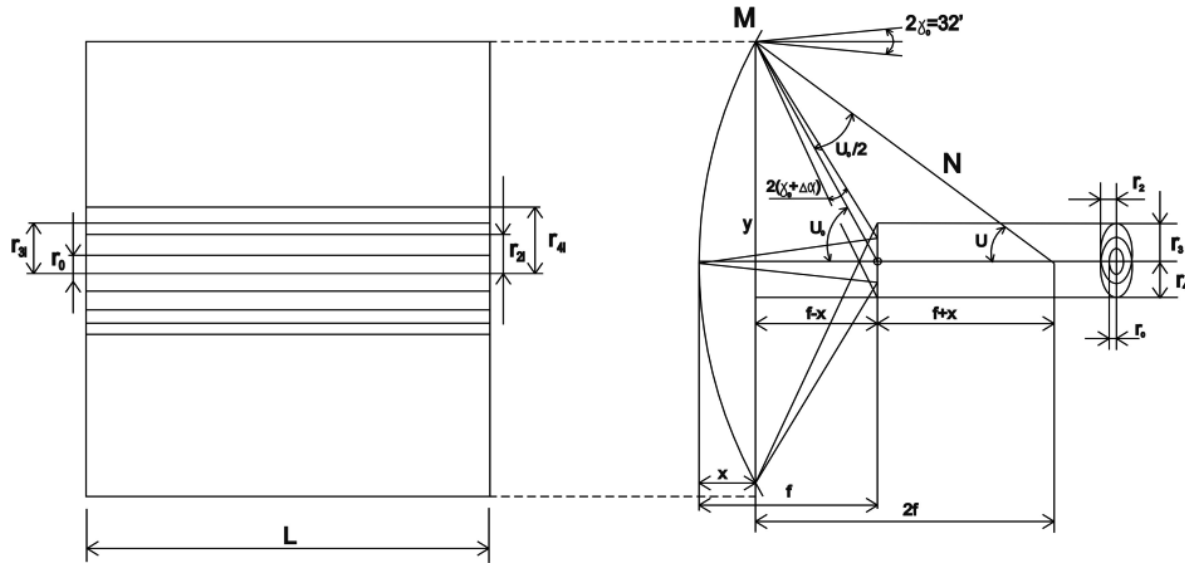


Figure 1. Formation of size and spot scattering density of parabolic-cylindrical MCS.

Table. – The sizes of the real spot dissipation are defined as follows:

**for accurate concentrator  
parabolic-cylindrical form**

$$\begin{aligned} r_0 &= ftg\gamma_0, \\ r_2 &= f\left(1 + tg^2 \frac{U_0}{2}\right)tg\gamma_0, \\ r_3 &= \frac{f\left(1 + tg^2 \frac{U_0}{2}\right)^2 tg\gamma_0}{1 - tg^2 \frac{U_0}{2} + 2tg \frac{U_0}{2} tg\gamma_0}, \\ r_4 &= \frac{f\left(1 + tg^2 \frac{U_0}{2}\right)^2 tg\gamma_0}{1 - tg^2 \frac{U_0}{2} - 2tg \frac{U_0}{2} tg\gamma_0}, \end{aligned}$$

**for inaccurate concentrator  
parabolic-cylindrical form**

$$\begin{aligned} r_0 &= ftg(\gamma_0 + \Delta\alpha), & (1) \\ r_2 &= f\left(1 + tg^2 \frac{U_0}{2}\right)tg(\gamma_0 + \Delta\alpha), & (2) \\ r_3 &= \frac{f\left(1 + tg^2 \frac{U_0}{2}\right)^2 tg(\gamma_0 + \Delta\alpha)}{1 - tg^2 \frac{U_0}{2} + 2tg \frac{U_0}{2} tg(\gamma_0 + \Delta\alpha)}, & (3) \\ r_4 &= \frac{f\left(1 + tg^2 \frac{U_0}{2}\right)^2 tg(\gamma_0 + \Delta\alpha)}{1 - tg^2 \frac{U_0}{2} - 2tg \frac{U_0}{2} tg(\gamma_0 + \Delta\alpha)}. & (4) \end{aligned}$$

where,  $f$  — focus distance,  $r_0, r_2, r_3, r_4$  — single dimension obtained in the focal plane of the solar image cone,  $U_0$  — angle concentrator disclosure,  $f$  — focal length,  $M$  — outermost point of the elementary section concentrating mirror-surface,  $\gamma_0$  — half apparent angular size of the Sun (often in the literature indicate that the value of  $\varphi_0$ ),  $r_c$  — range forms an image in the focal plane around,  $\Delta\alpha$  — the rms manufacturing errors.

The optimum size of the focal spot parabolic-cylindrical MCS ( $d_{opt} = 2r_{4opt}$ ) is determined on the basis of expression  $r_{4opt}$  obtained above.

$$r_{4opt} = \frac{d_{opt}}{2} = f\left(1 - tg^2 \frac{U_{opt}}{2}\right) \frac{tg\gamma(1 + tg^2 U_{opt})}{1 - tg U_{opt} tg\gamma} \quad (5)$$

where  $\gamma = \gamma_0 + \Delta\alpha = 16' + 16' = 32'$ ,  $tg\gamma = 0,0093$ ,  $\Delta\alpha$  — the standard deviation of the reflected beam from the optical surface of the  $\Delta\alpha = 4\delta$  and  $\delta$  — standard deviation of the normal optical surface.

Accordingly, the average of using concentration level of energy is defined as the ratio of the MCS to the midsection area obtained scattering spots, for example, a circular symmetric MCS is defined as follows [4]:

$$C = \pi R_k^2 / \pi r_i^2 = R_k^2 / r_i^2 \quad (6)$$

where,  $R_k^2 = y^2$  - determined from the ratio of said top (1-4) and a parabolic:

$$C_0 = y^2 / r_0^2, \quad C_2 = y^2 / r_2^2, \quad C_3 = y^2 / r_3^2, \quad C_4 = y^2 / r_4^2. \quad (7)$$

For parabolic-cylindrical:

$$C_0 = y/r_0, \quad C_2 = y/r_2, \quad C_3 = y/r_3, \quad C_4 = y/r_4. \quad (8)$$

to further define the energy distribution in the focal plane parabolic-

cylindrical MCS is necessary to determine the mean concentration for different values of  $r$  [5].

$$\begin{aligned} C_0 &= \frac{\left(2ftg \frac{U_0}{2}\right)}{(ftg\gamma_0)}, \quad C_2 = \frac{\left(2ftg \frac{U_0}{2}\right)}{\left(1 + tg^2 \frac{U_0}{2}\right)tg\gamma_0}, \\ C_3 &= \frac{2tg \frac{U_0}{2} \left(1 - tg^2 \frac{U_0}{2} + 2tg \frac{U_0}{2}\right)tg\gamma_0}{\left(1 + tg^2 \frac{U_0}{2}\right)tg\gamma_0}, \\ C_4 &= \frac{2tg \frac{U_0}{2} \left(1 - tg^2 \frac{U_0}{2} - 2tg \frac{U_0}{2}\right)tg\gamma_0}{\left(1 + tg^2 \frac{U_0}{2}\right)tg\gamma_0}, \end{aligned}$$

at  $U_0 = 900$ ,  $C_{max} = 1/tg\gamma_0$  for theoretically exact parabolic-cylindrical MCS  $\Delta\alpha = 0'$ ,  $C_{max} = 1/(0.00465) = 215$ .

$$r = (f-x) \frac{tgU_0 + tg\gamma}{1 - tgU_0 \cdot tg\gamma}, \quad (9)$$

$$y = (f-x)tgU_0, \quad (10)$$

$$C = \frac{y}{r} = \frac{tgU_0 \cdot (1 - tgU_0 \cdot tg\gamma)}{(tgU_0 + tg\gamma)}. \quad (11)$$

The optimum value of the degree of concentration is determined by  $C_{opt}$  equated to zero the derivative of  $C$  by  $U_0$

$$C dtgU_0 = \frac{tgU_0 \cdot (1 - tgU_0 \cdot tg\gamma)}{(tgU_0 + tg\gamma)} dtgU \quad (12)$$

After differentialequation finally we obtain the following quadratic equation:

$$tg^2U_0 + 2tgU_0 \cdot tg\gamma - 1 = 0.$$

The solution of this quadratic equation

$$tgU = -tg\gamma + \sqrt{tg^2\gamma + 1}. \quad (13)$$

Finally, after an analysis based on  $tg u \leq 1$  find an acceptable solution:

$$tgU_{1,2} = -tg\gamma + \sqrt{tg^2\gamma + 1} = -0.00465 + \sqrt{0.00465^2 + 1}. \quad (14)$$

We define value  $U_{opt}$  parabolic-cylindrical to initial conditions:  $\gamma = 16'$ ,  $tgU_0 = 0.41285$ ,  $U_0 = 44^\circ 52'$ .

Table 1 shows the dependence of the optimal angle of opening of precision manufacturing parabolic-cylindrical MCS

$\Delta\alpha$	0	4'	8'	12'	16'	20'	24'	1°
$tg(U_0/2)_{opt}$	0.41285	0.41251	0.41217	0.41183	0.41149	0.4111	0.4108	0.4091
$U_{opt}$	44°52'	44°50'	44°47'	44°46'	44°44'	44°42'	44°40'	44°29'

To achieve maximum energy density of required parabolic-cylindrical concentrator an aperture angle approaching  $90^\circ$ , which is the main condition for MCS technological purposes. For energy forced MCS is necessary to optimize the aperture angle to the precision manufacture.

$$C_{max} = \frac{\left(2ftg\frac{U_0}{2}\right)}{\left(1+tg^2\frac{U_0}{2}\right)tg\gamma_0} \quad (15)$$

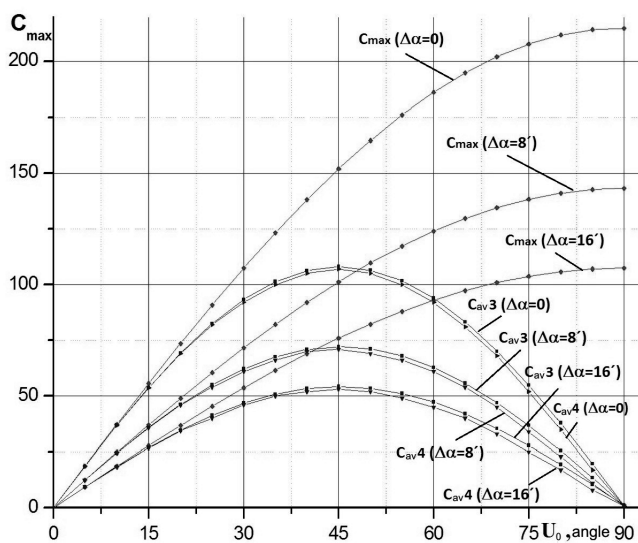


Figure 2a. Character change the maximum ( $C_{max}$ ) and secondary ( $C_{av}$ ) values respectively, the degree of concentration in the focal point on the focal plane of the MCS parabolic- cylindrical aperture angle  $U_0$ .

Calculations parabolic-cylindrical MCS led to the maximum concentration  $C_{max} = 215$  at  $U_0$  values (fig.3.a b). The analysis shows that for large  $C_{av}$  inaccuracies appear stronger. Thus if  $\Delta = 16'$  then  $C_{av} = 53$ .

#### Conclusions: $\Delta\alpha$

1. The expression of optimal concentrations of values depend-

$$C_{av} = \frac{2tg\frac{U_0}{2}\left(1-tg^2\frac{U_0}{2}-2tg\frac{U_0}{2}\right)tg\gamma_0}{\left(1+tg^2\frac{U_0}{2}\right)tg\gamma_0} \quad (16)$$

For high — temperature solar energy MCS purpose the most important characteristic is the average value of the concentration of the  $C_{av}$  and the value of the optimal radius  $r_4$ .

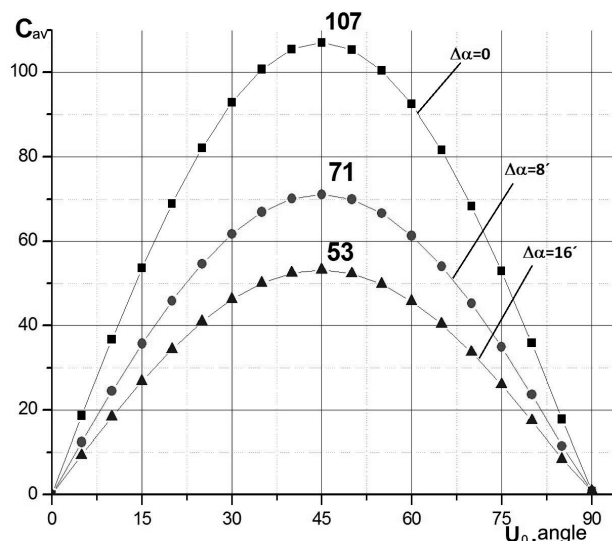


Figure 2b. The nature of changes in average  $C_{av}$  values respectively, the degree of concentration in the focal point on the focal plane of the MCS parabolic- cylindrical aperture angle  $U_0$ .

ing on the aperture angle are determined and the accuracy of its production for energy purposes at MCS  $\Delta\alpha=0$  opening angle is the optimum value  $U_{opt} = 44^\circ 52'$ .

2. The dependence of changes in the average and the maximum degree of concentration of the MCS on the size of the aperture angle and a manufacturing error  $\Delta\alpha = 4\delta r$  are obtained.

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## The analysis of change belt tension in the slack side of belt transmission

**Abstract:** The article is produced the results of determining in the belt tension in slack side of belt transmission. The analysis of laws changes belt tension in the slack side of belt transmission, Justify the parameters of transmission.

**Keywords.** Belt transmission, slack side of, tension, moment, lengthening of oscillation frequency, amplitude, moment of inertia.

**Introduction.** The belting used in drives of technological machine having variable load [1]. At the same time due to complex deformation belt, especially in lengthening occurs irregularities operation work in the transmission. To ensure the durability belt at the

expense of choice materials for belt is important to determine the belt tension, particularly in the slack side of belt transmission. On fig. 1 is a diagram for alternating transmission of belt tension [2; 3].

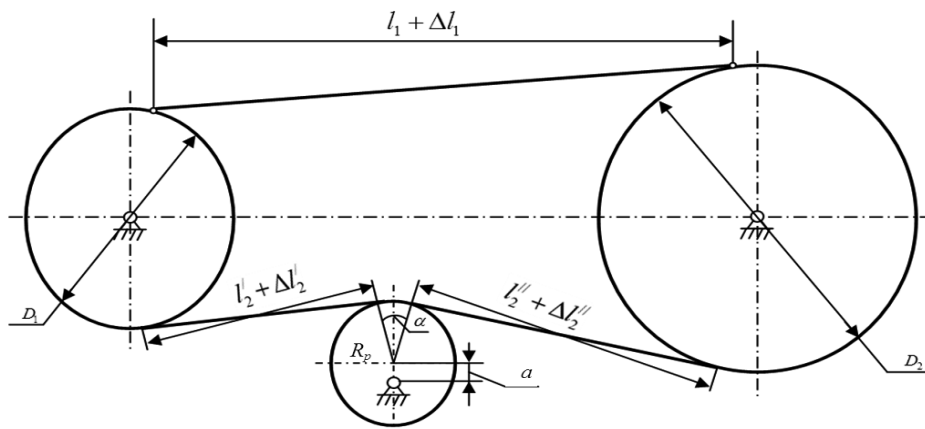


Figure 1. Diagram of the belt transmission with an eccentric tension roller

**The analytical solution of the problem.** According to the work of lengthening side of belt transmission determined from the expression:

$$\begin{aligned} \Delta l_1 &= \Delta \sigma_1 \left[ \frac{1}{E} + \frac{D_2}{2fE} (1 - e^{-f\phi_0}) \right], \\ \Delta l_2 &= \Delta \sigma_2 \left[ \frac{1}{E} + \frac{D_1}{2fE} (e^{-f\phi_0} - 1) \right] \end{aligned} \quad (1)$$

When,  $\Delta \sigma_1, \Delta \sigma_2$  -changing the belt tension in strand of transmission, Pa; E-modulus of elasticity belt, Pa;  $D_1, D_2$  – the diameter of the drive and driven pulleys, mm;  $f$  – friction factor of belt on the surface of the belt pulleys;  $\phi_0$  – elastic slip angle.

Differential equations describing the motion of the belt pulleys are of the form

$$\begin{aligned} J_1 \frac{d^2 \phi_1}{dt^2} + \frac{k_3 F D_1^2}{4} \phi_1 - \frac{k_3 D_1 D_2 F}{4} \phi_2 &= M_g, \\ J_2 \frac{d^2 \phi_2}{dt^2} - \frac{k_3 D_1 D_2 F}{4} \phi_1 + \frac{k_3 D_2^2 F}{4} \phi_2 &= M \sin \omega t \end{aligned} \quad (2)$$

Where,  $k_3 = (k_1 + k_2) \frac{1}{k_1 k_2}$ ;  $k_1 = \frac{1}{E} + \frac{D_2}{2fE} (1 - e^{-f\phi_0})$ ;

$$k_2 = \frac{1}{E} + \frac{D_1}{2fE} (e^{-f\phi_0} - 1), \quad M_g = M_1 \sin jt.$$

$M_g$  – moving moment on the shaft to the drive pulley  
 $M_1 M_0$  – the motion of the amplitude hesitation and disturbing moments

The solution of system (2), differential equations belt drive as form:

$$\phi_1 = \phi_{10} \sin \omega t, \quad \phi_2 = \phi_{20} \sin \omega t \quad (3)$$

Supplying (3), respectively, in the equation (2) we obtain the expression for determining the values of the amplitude hesitation of the belt pulleys

$$\phi_{10} = \frac{A}{B} \left[ \frac{B \left( \frac{M_1 \sin jt}{\sin \omega t} + J_1 \omega^2 \right) + A (J_1 \omega^2 + M_0)}{A^2 - B^2} \right] - \frac{J_2 \omega^2 + M_0}{B},$$

$$\phi_{20} = \frac{B \left( \frac{M_1 \sin jt}{\sin \omega t} + J_1 \omega^2 \right) + A (J_1 \omega^2 + M_0)}{A^2 - B^2} \quad (4)$$

Where,  $A = K_3 \frac{D_1^2 F}{4}$ ;  $B = K_3 \frac{D_1 D_2}{4} F$ ;

Herewith tension will change  $\Delta \sigma_{10} = \frac{R_1 \phi_{10} - R_2 \phi_{20}}{k_1}$ ,

$$\Delta \sigma_{20} = \frac{R_2 \phi_{20} - R_1 \phi_{10}}{k_2} \quad (5)$$

Then, full of tension in the slack side of belt transmission gets

$$\sigma_1 = \sigma_{10} + \Delta\sigma_{10} \sin \omega t, \quad \sigma_2 = \sigma_{20} + \Delta\sigma_{20} \sin \omega t \quad (6)$$

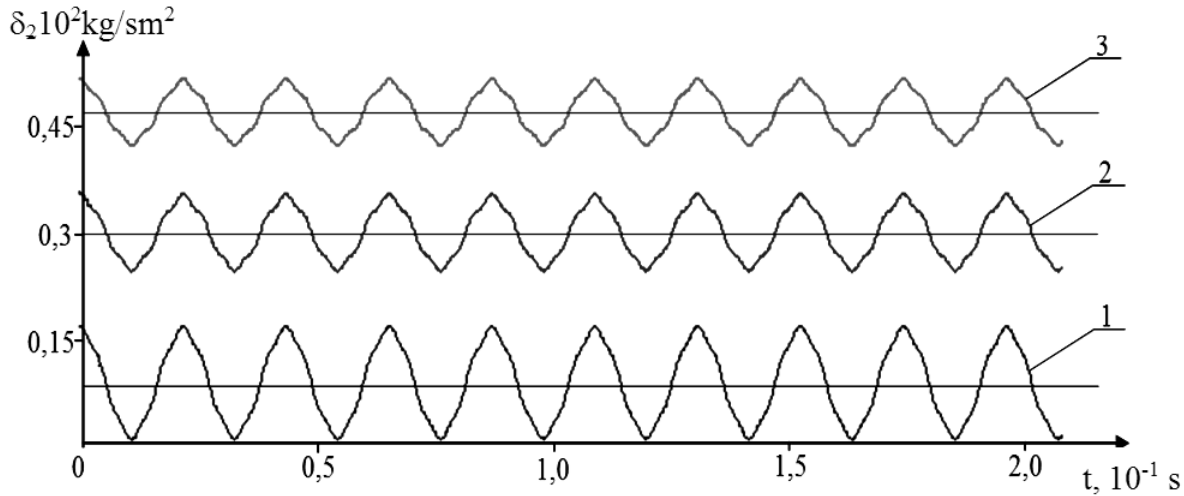
**Analysis of the results.** Numerical solution and analysis of results change on  $\sigma_1$  and  $\sigma_2$  carried out under the following initial values of the parameters belt drive with variable gear ratio:

$$R_1 = 1,5 \cdot 10^{-3} \text{ m}; \quad R_2 = 2,0 \cdot 10^{-3} \text{ m}; \quad I_1 = 0,02 \text{ kgm}^2; \quad I_2 = 0,033 \text{ kgm}^2;$$

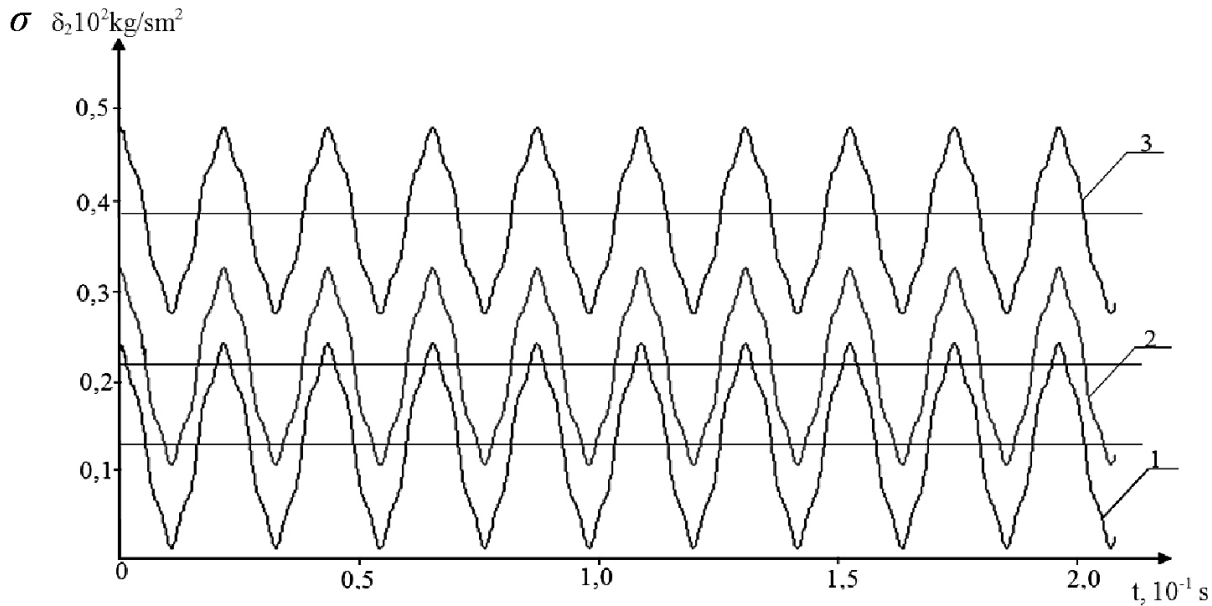
$$F = 2,5 \text{ sm}^2; \quad \sigma_0 = 22 \text{ kg/sm}^2; \quad \omega = 0,75 \text{ p22}; \quad \sigma_{10} = 40 \text{ kg/sm}^2; \quad \sigma_{20} = 40 \text{ kg/sm}^2; \\ M_0 = 25 \text{ Nm}; \quad E = 12 \cdot 10^2 \text{ kg/sm}^2; \quad l = 0,185 \cdot 10^{-3} \text{ sm}; \quad M_1 = 8,5 \text{ Nm}.$$

It is important in the study of oscillating voltage in slack side of belt transmission with glance on the tensioning device.

Research are shown that the character of the oscillating voltage in the slack side of belt transmission actually does not affect the value of the pre-tensioning  $\sigma_{20}$  (see. Fig. 2a, b).



Where, a: 1- $\Delta\sigma_{20} = 0,040 \cdot 10^2 \text{ kg/sm}^2$ , to  $\sigma_{20} = 0,01 \cdot 10^2 \text{ kg/sm}^2$ ;  
2- $\Delta\sigma_{20} = 0,028 \cdot 10^2 \text{ kg/sm}^2$ , to  $\sigma_{20} = 0,32 \cdot 10^2 \text{ kg/sm}^2$ ;  
3- $\Delta\sigma_{20} = 0,026 \cdot 10^2 \text{ kg/sm}^2$ , to  $\sigma_{20} = 0,48 \cdot 10^2 \text{ kg/sm}^2$



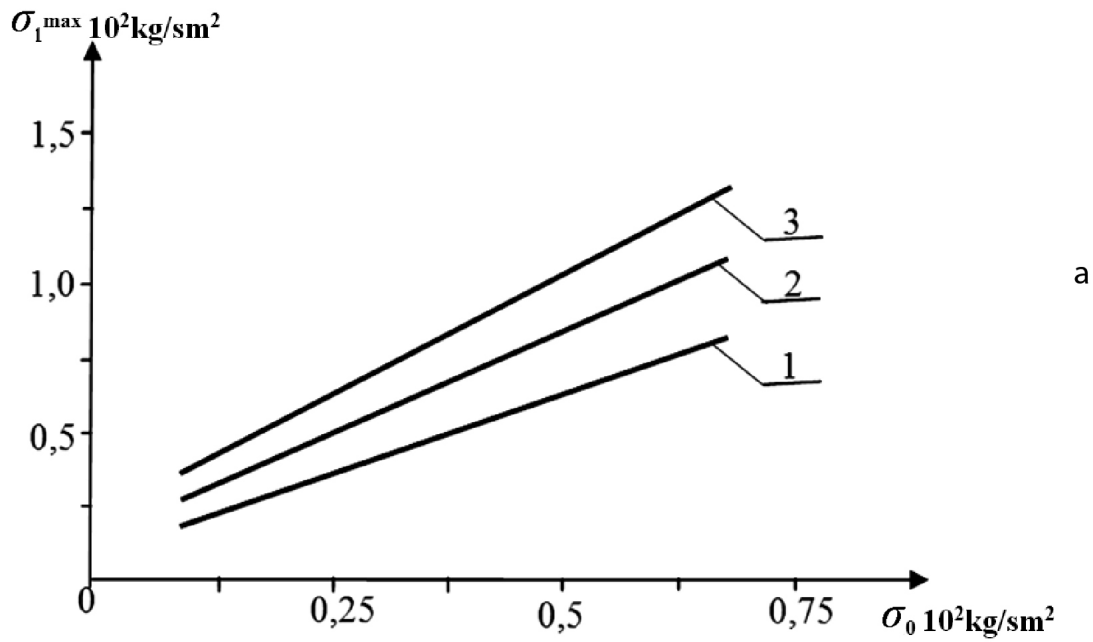
Where, b: 1- $\Delta\sigma_{20} = 0,12 \cdot 10^2 \text{ kg/sm}^2$ ; 2- $\Delta\sigma_{20} = 0,23 \cdot 10^2 \text{ kg/sm}^2$ ;  
3- $\Delta\sigma_{20} = 0,38 \cdot 10^2 \text{ kg/sm}^2$ ; to  $-\Delta\sigma_{20} = 0,11 \cdot 10^2 \text{ kg/sm}^2$

Figure 2. Regularities of change on belt tension in the slack side of belt transmission on Fig.3 shows the dependence of the change  $\sigma_{1\max}$  max increase  $\sigma_{20}$  with variation  $M_0$

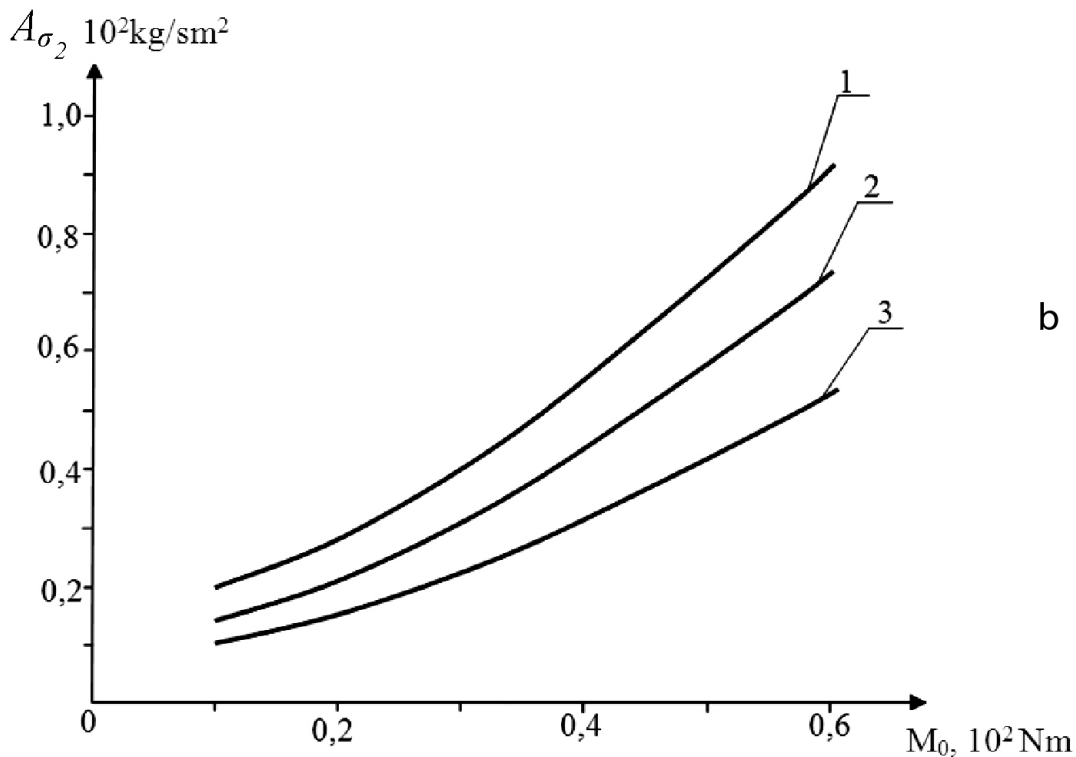
The graphs shown that with increasing  $\sigma_{20}$  tension increased in linear regularity. So, while increasing of the value  $\sigma_{20}$  from  $0,082 \cdot 10^2 \text{ kg/sm}^2$  to  $0,75 \cdot 10^2 \text{ kg/sm}^2$  the maximum value of the tension  $\sigma_{1\max}$  in slack side of belt transmission is increased  $0,145 \cdot 10^2 \text{ kg/sm}^2$  to  $0,58 \cdot 10^2 \text{ kg/sm}^2$  at  $M_0 = 30 \text{ Nm}$ . Where in  $M_0 = 50 \text{ Nm}$ , the maximum value of the tension in the slack side of belt transmission increases to  $1,29 \cdot 10^2 \text{ kg/sm}^2$  Wherein reduce the belt tension in the slack side of belt  $\sigma_{1\max}$  considered appropriate reduction on resistance in form of driven pulley, as a preliminary tension of a belt.

Tolerant range of change on parameters for a belt transmission with the reviewed initial value of parameters are  $M_0 \leq (40 \dots 45) \text{ Nm}$ ,  $\sigma_{20} \leq (0,30 \dots 0,45) \cdot 10^2 \text{ kg/sm}^2$ . The amplitude of the oscillations of tension in the slack side of belt transmission are based on depends from the amplitude resistance to moment and the moment of inertia pulleys (see. Fig. 3b)

Based on the dependent of graphical analysis in Fig. 3 b identified the recommended values of the moments inertia pulleys and  $M_0$ , amplitude, which correspond to the results and graphs in Fig. 3 a:



Where, 1- $M_0=30 \text{ Nm}$ ; 2- $M_0=40 \text{ Nm}$ ; 3- $M_0=50 \text{ Nm}$



Where, 1-to  $I_1 = 0,050 \text{ kgm}^2$ ;  $I_2 = 0,075 \text{ kgm}^2$ ;  
 2-to  $I_1 = 0,035 \text{ kgm}^2$ ;  $I_2 = 0,055 \text{ kgm}^2$ ; 3-to  $I_1 = 0,02 \text{ kgm}^2$ ;  $I_2 = 0,035 \text{ kgm}^2$

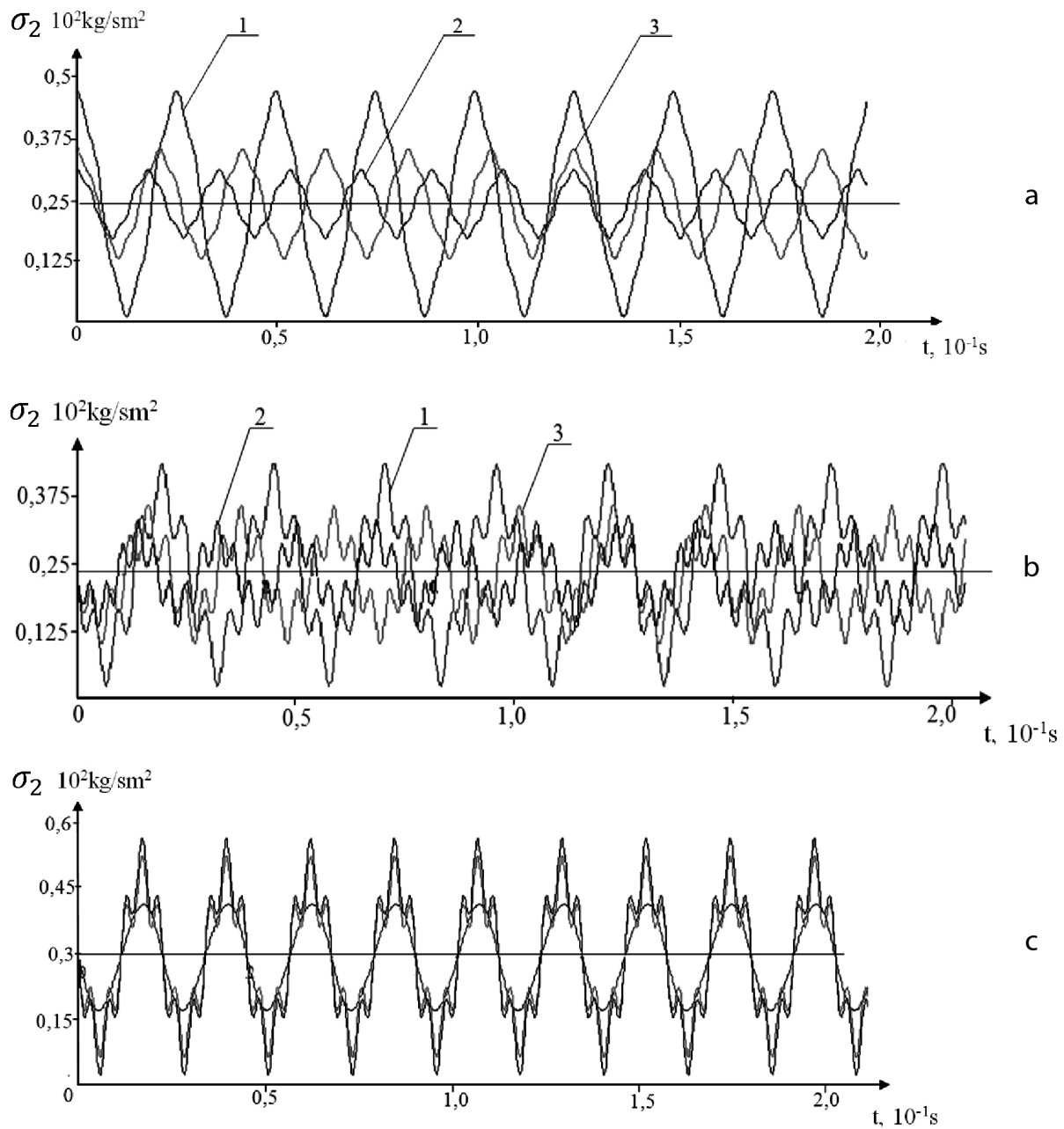
Figure 3. Laws of the maximum value change in the slack side of belt transmission from changes in the pre-tension in slack side of belt (a) and the amplitude of the oscillations voltage in slack side of belt transmission from variation  $M_0$

$I_1 = (0,035 \dots 0,046) \text{ kgm}^2$ ,  $I_2 = (0,057 \dots 0,068) \text{ kgm}^2$ ;  $M_0 \leq (40 \dots 45) \text{ Nm}$ .

On Fig. 4 shows the laws of oscillations voltage in the slack side of belt transmission from variation the value of rang amplitude  $\Delta\sigma_{20}$  and changed frequency moment  $\omega$  and  $j$  lead and driven pulleys.

According to analysis laws of changes on  $\sigma_2$  as shown on Fig. 4 shows that with increasing frequency difference moving moment on the wave to the drive pulley  $j$ , and frequency oscillation of resistance to the moment on the wave to the drive pulley  $\omega$  leads to a phase shift, which may lead to negative result.

That's why it considered appropriate to change moment closely to each other (see. Fig. 4). That's why It recommended limits of variation frequencies  $\omega_1 = (30 \dots 40) \text{ s}^{-1}$  and  $j = (40 \dots 45) \text{ s}^{-1}$ . In addition amplitude change  $A_{\sigma_2}$  does not affect the character of oscillating voltage in the slack side of belt transmission (see. Fig. 4).



Where, a, b: 1- $\omega_1=40\text{ s}^{-1}$ ;  $j=50\text{ s}^{-1}$ ;  $\Delta\sigma_{20}=0,24\cdot 10^2\text{ kg/sm}^2$ ;  
 2- $\omega_1=40\text{ s}^{-1}$ ;  $j=55\text{ s}^{-1}$ ;  $\Delta\sigma_{20}=0,125\cdot 10^2\text{ kg/sm}^2$ ;  
 3- $\omega_1=40\text{ s}^{-1}$ ;  $j=60\text{ s}^{-1}$ ;  $\Delta\sigma_{20}=0,130\cdot 10^2\text{ kg/sm}^2$ ;  
 in:  $\omega=j=40\text{ s}^{-1}$ ; 1- $\Delta\sigma_{20}=0,28\cdot 10^2\text{ kg/sm}^2$ ; 2- $\Delta\sigma_{20}=0,25\cdot 10^2\text{ kg/sm}^2$ ;  
 3- $\Delta\sigma_{20}=0,14\cdot 10^2\text{ kg/sm}^2$

Figure 4. Laws of change tension in the slack side of belt transmission from variation amplitude  $\Delta\sigma_{20}$  and frequency moments on the drive and driven pulleys

**Conclusions.** Formulaic for the calculation of tension in the slack side of belt transmission with tensioning device. On the basis of numerical solution on the problem defined laws of oscilla-

tions voltage in the slack side of belt transmission. Justify the parameters of transmission.

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## Studying material composition and leaching methodics trial ores deposit of beshkuduk (Uzbekistan)

**Abstract:** The article presents the study of the material composition and technology of enrichment of ore samples field Beshkuduk (Uzbekistan). Material composition of the samples was studied using semiquantitative spectral, chemical, rational, and mineral analysis. Established that the main part of the gold to be in ultradispersed state. A small part of concentrated isolated grains (formed by combining micron gold particles) that are related in dimension to the small class, have a plate-like, irregular, elongated shape with a perforated, spongy structure.

**Keywords:** leaching, enrichment of ore, mineral analysis, rock-forming minerals, crushing, screening, hypogene minerals, concentrate isolate grains.

Technological test No. 1 before testing was prepared by a standard technique of fig. 1. At the same time samples for the mineralogical analysis were selected, and also average tests for production of various analyses are allocated. The material structure of test was studied by means of semi-quantitative spectral, chemical, rational and mineralogical analyses.

Results of the semi-quantitative spectral analysis of average test of ore are given in tab. 1.

Table 1. – Results of the semi-quantitative spectral analysis of ore

Elements	Contents,%	Elements	Contents,%
Silicon	>1	Vanadium	0,004
Aluminum	>1	Chrome	0,01
Magnesium	>1	Lead	0,002
Calcium	0,8	Antimony	
Iron	>1	Arsenic	0.06
Manganese	0,06	Zinc	0,008
Nickel	0,004	Gallium	0,001
Cobalt	0,003	Sodium	>1
Titan	0,2	Kalin	>1
Molybdenum	-	Copper	0,004
Zirconium	0,004	Barium	0,2

The full chemical analysis of tests of ore is provided in tab. 2.

Table 2. – Results of the chemical analysis of ore

Name of a component	Contents in test,%	Name of a component	Contents in test,%
Silicon dioxide	60,5	Sodium oxide	2,66
Iron shaft	5,2	Oxide of phosphorus (+5)	0,16
Oxide of iron (+3)	6,08	Carbon oxide (+4)	0,77
Oxide of iron (+2)	1,23	Sulfur the general	0,36
Titanium dioxide	1,03	Oxide of sulfur (+6)	0,89
Manganese oxide	0,11	H <sub>2</sub> O gigr..	0,83
Alumina	15,33	item pct.	4,4
Calcium oxide	1,72	Gold, g/t	6,5
Magnesium oxide	1.6	Silver, g/t	4,0
Potassium oxide	3,76		



The standard technique developed IRGIRAREMET [1], concluding in consecutive carrying out the following operations has been applied to carrying out the rational analysis: cyanation, alkaline processing with the subsequent cyanation, acid processing and then processing by nitric acid with the subsequent cyanation, the acid rest.

The rational analysis was carried out on the ore crushed to fineness of 85% of a class — 0,074mm.

Results of the rational analysis of average test of ore are given in tab. 3.

Table 3. – Results of the rational analysis of ore on gold and silver

Form of finding of noble metals and nature of their communication with ore components	Placement			
	Gold		Silver	
	g/т	%	g/т	%
Gold, silver in the form of free metal grains and in the form of joints with ore components	6,08	93,4	2,44	61,1
The gold, silver associated with minerals and chemical compounds of antimony and arsenic, silver sulfosalts	–	–	–	–
The gold, silver connected with carbonates, oxides, hydroxides iron and manganese	0.01	0,2	0,44	11,1
The gold, silver which are thinly interspersed in pyrites and arsenopyrite	0,25	3,9	0,68	16,7
The gold, silver interspersed in quartz Alumo-siliciums, etc. rock-forming minerals	0,16	2,5	0,44	11,1
Total in ore:	6,5	100	4.0	100

As appears from tab. 3, gold in test for 93,4% is presented by cyanic forms, silver — only for 61,1%. A considerable part of silver of 11,1% is released after salt acid processing. 3,9% of gold and 16,7%

of silver are connected with sulfides (generally with pyrites). 2,5% of gold and 11,1% of silver are connected with rock-forming minerals.

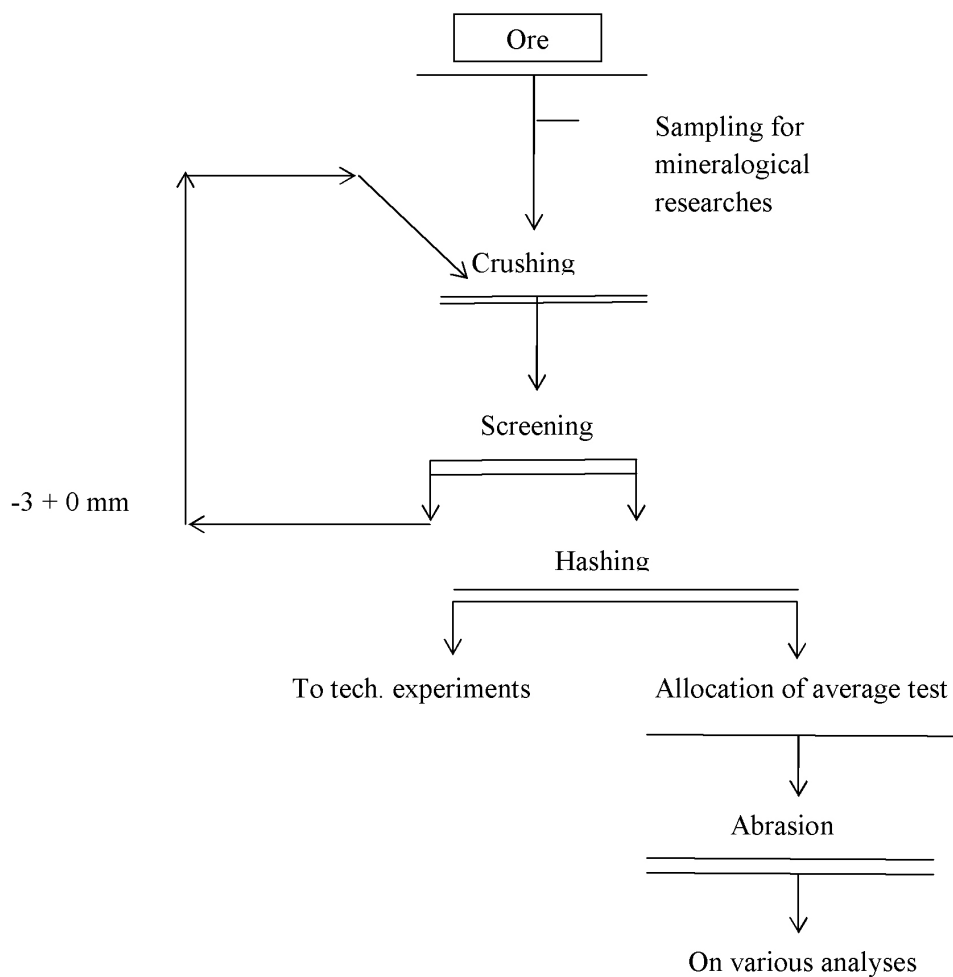


Figure 1. The scheme of preparation ore devices to tests

For clarification of distribution of gold and silver on fineness classes initial ore (fineness the 3–0th), has been subjected to the

sieve analysis. Results of the sieve analysis of average tests of ore are given in tab. 4.

Table 4. – Results of a sieve of the analysis of average tests of ore

Classes of fineness, mm	Exit,%	Components, g/t		Placement,%	
		gold	silver	gold	silver
-3+2,5	16,0	4,75	3,87	11,72	15,48
-2,5+1,5	32,0	6,68	5,16	33,0	41,29
-1,5+1,0	13,0	5,58	2,84	11,19	9,22
-1,0+0,5	15,0	9,59	4,13	22,22	15,48
-0,5+0,25	11,0	5,35	2,58	9,08	7,1
-0,25+0,1	9,0	6,18	3,23	8,58	7,26
-0,1+0,063	3,0	6,68	3,87	3,11	2,9
-0,063+0	1,0	7,28	5,16	1,1	1,27
Ore -3+0	100,0	6,5	4,0	100,0	100,0

Apparently from tab. 4, in ore test the content of gold and silver rather low in large classes. In a class of — 0,063+0 mm the content of gold and silver increases to 7,28 and 5,16 g/t respectively. An exit of small classes -1+0 mm is insignificant — 4,0%, the main part of gold and silver is connected with classes in limits -2,5+0,1mm — 80,35%.

Material of test consists from strongly changed, the on ferrous, silicate — chlorite, the siliceous and partially the arbitrations of breeds.

Test belongs to gold-bearing, changed type of ores.

For the purpose of definition of mineral composition of ore have been used: material of average test of the ore disseminated on fineness classes, gravitation concentrate, the magnetic fraction, samples which are selected from damask material, the transparent and polished micro sections, mono mineral tests with attraction of spectral, chemical, atomic and absorbing analyses and the electronic microprobe «JEOL» IGG AC RUz.

Distinctive feature of ore is the grains (the aggregate consisting from «p» fine particles) of a native gold that isolated, concentrated

form thinly lamellar, perforated allocations at which holes are filled and grew together with micas, a hydra with oxides, oxides of iron and arsenic.

As test is significantly oxidized, the most widespread hyper gene minerals are iron hydroxides — getit, gidrogetit. Less widespread minerals of an ore origin are skorodit, yarozit, difficult copper and ferruterous and aluminum hyper gene compounds and silicates of lead. Also micaceous minerals of iron and tin meet in single signs.

Hypogene minerals — pyrites, arsenopyrite — meet in single and rare signs in the form of relicts in products of the transformations.

The main nonmetallic minerals of test are quartz, sericite, field spars, chlorite.

Accessory minerals are provided generally by apatite, a monocyte and, partially, zircon and sfeny.

The list of the minerals composing ore, their quantitative ratios, the sizes of grains and mono mineral aggregates are provided in tab. 5.

The chemical composition of some above-mentioned attendees of minerals is given in tab. 5. The analysis is made by the electronic microprobe.

Table 5. – Approximate quantitative ratios of the minerals composing ore, the sizes of their grains and mono mineral units of the field Beshkuduk, tests No. 1

№ п/п	Name of minerals	Contents,%	The sizes of grains in mm			
			In present		Prevails	
			from	to	from	to
1	Gold native	grain unit	<0,001	0,5	Thinly –and ultradisperse	
2	Iron native	grain unit	0,001	0,03		
3	Tin native	grain unit	0,001	0,01-0,02		
4	Hematite	grain size	0,01	0,1		
5	Pyrites		Relic grains 0,001–0,03			
6	Arsenopyrite	grain size	Relic and fine-crystalline			
7	Galenite	grain unit	0,01	0,02		
8	Barisilit	grain size	Fine-crystalline			
9	Skorodit	grain size	Fine-crystalline			
10	Gidrogetit + getit	-6,0	0,001	1,0	0,05	0,2–0,3
11	Complex hydro-aluminosilicates of iron + are yarozit by potassium – sodium	-3,0	Fine-crystalline			
12	Quartz	29,0	0,001	0,5	0,01	0,2
13	Plagioclase sour and the main	24,0	0,05	0,4	0,05	0,3
14	Sericite	22,5	Fine-scaled			
15	Chlorites	6,0	Fine-scaled			
16	Orthoclase	5,6	0,1	1,0	0,2	0,5
17	Calcite	1,8	Fine-crystalline –0,3			
18	Rutile	1,0	0,001	0,03	0,01	0,02
19	Apatite	0,4	0,001	0,05	0,01	0,02
20	Monocyte and other rare lands	0,4	0,001	0,03		
21	Zircon	grain unit	0,001	0,1	0,03	
22	Sfen	grain unit	0,001	0,05	0,03	

**Conclusions:**

1. The main valuable component of test is gold which is connected, generally with oxides and hydroxides of iron and arsenic. Perhaps, pyrites and arsenopyrite were primary gold-bearing minerals.
2. The main part of gold to be in an ultra disperses state. A small part of the concentrated isolated grains (is formed due to association of micron particles of gold) belonging on dimension to the small

- class have the lamellar, wrong, extended form with perforated, spongy structure. Their dimension doesn't exceed 0,1–0,5 mm.
3. The main hyper gene ore minerals are getit and gidrogetit.
4. Widespread nonmetallic minerals are quartz, sericite, chlorites.
5. The high content of scaly releases of sericite and chlorite, and also filling of a time with them perforated, concentrated gold prevents ore enrichment.

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**Formation of functional-consumer complex uniforms schoolchildren**

**Abstract:** This article is devoted to solving the issue of integrated design and manufacture of uniforms for students of technology. Studies have been done taking into account regional peculiarities klimogrammy Republic, taking into account the development of functional and consumer complexes and situational design to ensure maximum comfort of consumers' uniforms.

**Keywords:** uniforms, heat balance, functional and consumer complexes, comfortable environment, contingency planning, socks conditions, the local mentality.

In the context of the implementation of the national clothing industry competitiveness modernization program relevant issues and improve the quality of finished products. For the current state of the domestic children's clothing market is characterized by a dominant share of imported goods. The main reasons for this are: quality workmanship and appearance of domestic products often does not meet the needs of consumers; lag and mismatch requirements of children's clothing and fashion trends; limited range of raw materials for the production of uniforms for students.

The urgency of this problem is determined by what is now widely discussed the need for introducing a single uniform, meeting modern requirements of functional consumer complex and provides a comfortable fit conditions. It is necessary to take into account the great importance of a unified form as part of the educational process of the educational institution.

This issue devoted to the work E. B. Koblyakova, H. H. Kamilova, L. P. Shershneva, N. S. Makeeva, I. V. Cherunova, L. K. Kuatbekova, L. Sh. Shamuhitdinova, N. Y. Sukontseva, S. V. Kurënova, E. V. Baskakova, S. A. Goncharova, Yu. A. Matsievska and a number of other scientists. But in these studies uniforms regarded as normal wear and special studies the value of uniforms as a tool in the educational and learning process and the mechanism for the formation of the complex requirements for the manufacture of uniforms for students of technology, taking into account local conditions and socks mentality were not carried out.

Prevailing practice techniques and methods of integrated design and manufacturing of children's clothing technology is not enough focus on the requirements of this category of consumers and cannot be used without a fundamental information support and substantial improvements for a number of reasons. There is a change of priorities and social values: to uniform requirements for pupils of different age and gender groups is significantly differenti-

ated. The situation of consumption of products children have their own specificity, which must take into account the conditions and the time of the socks, the environment and other factors ensures maximum comfort uniforms consumption.

In this part of the work will be considered by the conditions that create the optimum thermal comfort level. General equations, based on which will be calculated, at any level of activity and any kind of uniform, all interconnection environment (air temperature, air humidity, its relative speed, etc.), which will create the optimum thermal comfort will be displayed [1].

Since the thermal comfort is the main purpose of socks students in Uzbekistan, the development of functional and consumer complexes uniforms for the students were made to investigate the comfort of man. The research was carried out a series of experiments, where the environment has been measured in the real world wear uniforms, and at the same time, the participants were asked to express their opinion of their thermal sensation on special scales. Then, research results were processed and determined the optimum temperature for klimogramm the region where conducted environmental studies for the actual group (Table).

So, one of the key points in the design of children's products is the account information structure in climatic conditions. Using the table structure of the climate in different classes of the weather, used in medical climatology highlighted temperatures and determined the distribution of weight and grade of the weather for the area, both during the year and by month. For example, the distribution of classes of the weather and their weight within a year: d1 — very cold temperate humid days; d2 — cold moist, moderately humid days; d3 — moderately dry, semi-moist and moderately humid days; d4 — warm, dry, semi-moist and moderately humid days; d5 — very warm, dry, semi-dry, moderately wet and humid days and d6 — hot, dry, dry and moderately humid days.

Table 1. – Klimagramm the Republic of Uzbekistan and their weight regions weathers share classes

№	Classes weathers	Designation	Ponderability	
			Days of the year	Shares, in%
1.	Very cold temperate humid days and wet days	d <sub>1</sub>	4,83	1,32
2.	Cold moist, moderately moist and humid days	d <sub>2</sub>	36,24	9,92
3.	Moderately cold dry, dry moderately moist and humid days	d <sub>3</sub>	114,47	31,36
4.	Warm, dry, semi-moist and moderately humid days	d <sub>4</sub>	112,02	30,7
5.	Very warm, dry, semi-dry, moderately wet and humid days	d <sub>5</sub>	78,75	21,6
6.	Hot, dry, semi-dry and moderately humid days	d <sub>6</sub>	18,79	5,14
<b>Total:</b>		D	365	100%

On the basis of functional processes and life of students, taking into account the daily time fund of consumers, as well as the results of a survey of parents and the design of the experiment determined the model and the generalized daily time budget.

Time budget developed by the example of the consumer group of primary school children on the basis of a standard daily time budget. Revealed the highest percentage duration of certain activities, therefore their weight.

Crossing typologies in the direction of the modules typical daily budget consumers time and temperature conditions of modules will give the desired result — a specific range of the SS. Review of the list of the SS in the context of consumer preferences will identify the most common combinations of situations and the hierarchy of consumer requirements for the composition and structure of clothes to better meet the demand for uniforms [2; 3].

It should be noted that the intersection of the procedure should be performed whenever the formation of functional-consumer complex at this period of time. This is the advantage of this method and situational design uniforms.

The grouping of the nomenclature of the consumer situation and the means of their objective to ensure it provides the opportunity to supplement, change and development, depending on the changes and development of the real life of people in the system «man-wear- environment».

In the second stage of the work carried out on the formation of a rational wardrobe of uniforms and basic types of sets for the identified situations, the establishment of consumer and industrial requirements for types of products under development.

Thus, the consumer situation is the basis for the development of optimal nomenclature and assortment formation of groups of species and varieties of children's products on the basis of design and typological approach and functionally-consumer complexes using methods and design tools. Formation range of children's products and its purpose must be based on a synthesis of consumer situations and consumer preferences. To operate this information is necessary to conduct market research and practical application of the study of the daily time budget.

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## Power-efficient method of tillage and its technology model

**Abstract:** In the clause the results of researches by definition of qualitative parameters of work of working bodies of the combined unit for the minimal processing of ground are given. By definition of depth and width of the loosened zone, and also the heights of the formed crests structures of their cross section are constructed.

**Keywords:** technology, method, soil, crop, engineering tools, energy, cotton-plant, ridge, chemical fertilizers, soil tillage, opportunity, ripper, ridge-forming tools, fertilizer plows, chemical fertilizers feeder.

At present time soil tillage for sowing and crops preparation are mainly put into practice by means of traditional technologies and engineering tools, that is plowing firstly, harrowing and leveling secondly, after which ridges are cut. Such multi-step tillage provokes big labor inputs, expenditure of energy and fuel, delays sowing time

that results in yield drop of agriculture.

On the assumption of the above-stated we have developed a new tillage technology model for cotton-plant sowing and a component unit for its implementation.

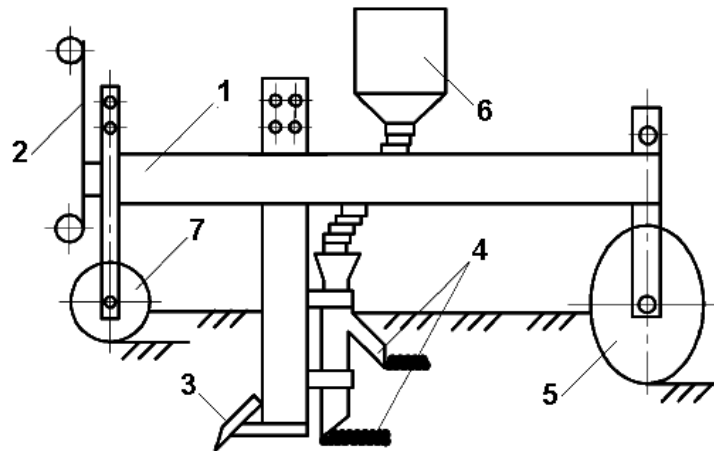


Figure 1. Component unit design

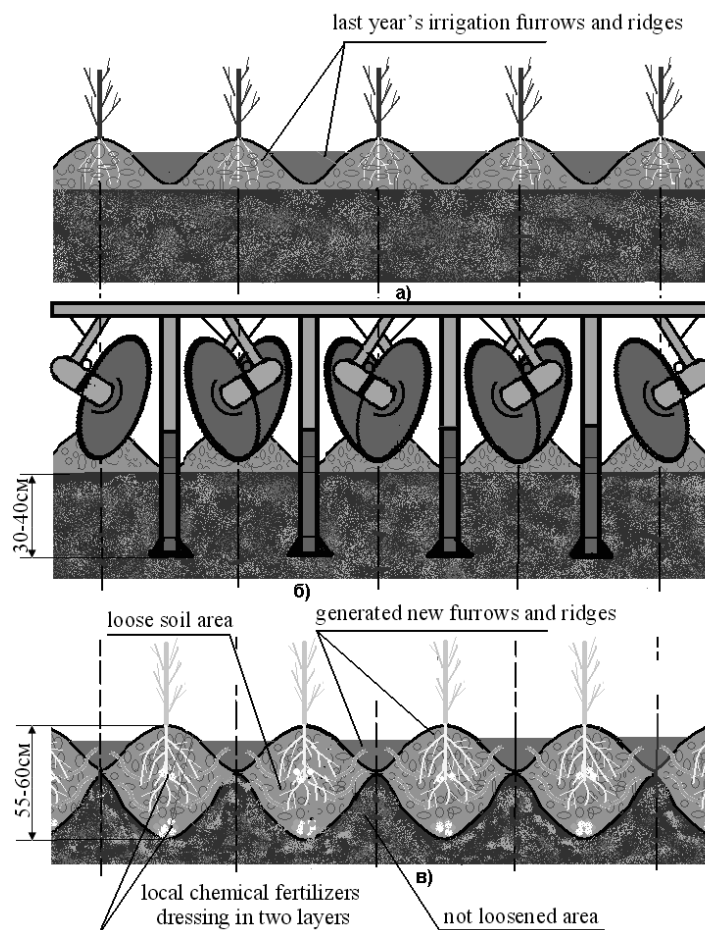


Figure 2. Component unit operating procedure

a – ridges before the unit run; b – unit operating procedure; c – generated new ridges

The engineered unit is composed of (Fig.1) chassis 1 with mounted element 2, rippers 3, fertilizer plows 4, ridge-forming tools 5, chemical fertilizers feeder 6 and support wheels 7.

The unit in a run mellows the bottom of the last years' irrigation furrows at a depths of 30–40 cm (Fig. 2, a and b), moulds the old ridges in furrows, moulds new ridges (Fig.2, c) dressing them with two-layer strip of chemical fertilizers. In that way, the new ridges are cut due to demolition of the old ridges and soil slip to the area of old ridges (Fig.2, a).

At the same time a layer of loose soil of 55 –65 cm depth is formed as compared to 30–40 cm in the case of plowing. In spring the ridges are touched up and chemical fertilizers are dressed for cotton-plant sowing. Thus there is no need to carry out such traditional operations as harrowing, chisel plowing and leveling. Consequently, fuel consumption and labor inputs are reduced.

Soil tillage is carried out sinusoidal along the frontal projection. Because of this the soil structure is disturbed only once in two

years. Loose soil area is formed under the ridge that ensures moisture keeping in the zone of the plant root system, as well as saving of irrigation water consumption.

Realization of the new tillage technology gives an opportunity to reduce 1,3–1,4 times labor inputs and fuel consumption for soil tillage for cotton-plant sowing.

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## Substantiation technological and design data сошника for crops of seeds of winter wheat in cotton row-spacing

**Abstract:** The article presents the theoretical study of materials on substantiation of technological and design parameters of the coulters for seeding winter wheat seed cotton in the aisles.

**Keywords:** knife; working-organ; wings; seed-funnel; multi-crop in the aisles; groove profile; optimum density; efficiency; productivity.

For crops of seeds of autumn wheat in cotton row-spacing offers a new working-organ (drill colter). Novelty of the technical decision is protected by patent UZ FAP 00722 [1].

Proceeding from the received patent, it was necessary to prove technological and design data of a new working-organ (fig. 1).

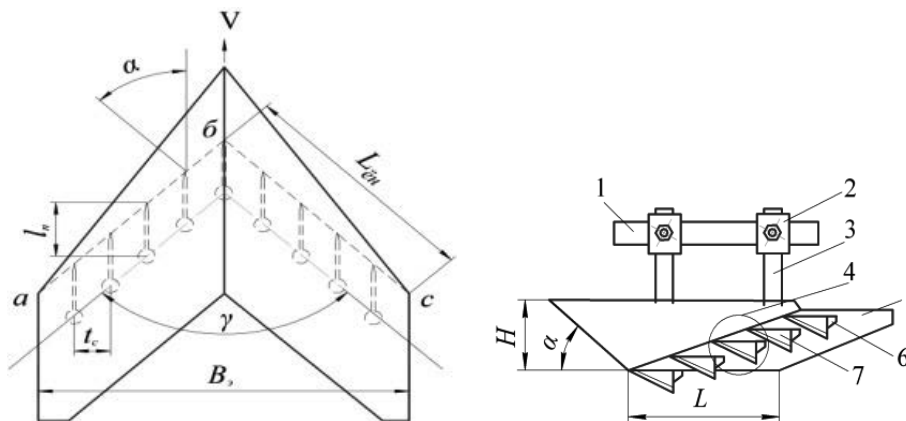


Figure 1. Schemes working-organ, a copying and forming row-spacing of cotton

1 – beam, 2 – lock, 3 – racks, 4 – and 5 – wings, 6 – seed-funnel, 7 – knife

The offered new technology and design сошника carries out multi lower case crops from 5 (for row-spacing of 60 sm) to 9 (for row-spacing of 90 sm) рядков. At the expense of formation of the new friable form of a furrow of a row-spacing the useful area of crops of seeds on 9 ... 22% in comparison with strew increases in the way, is provided conditions for uniform crops and reception of amicable shoots.

For maintenance of the new, slightly condensed form of the furrow demanded uniformity of depth of crops, working-organ in the course of work should be constantly to nestle on a row-spacing surface that is the condition [2] should be met.

$$Q = Q_{opt}$$

Where:  $Q_{opt}$  — Optimum reaction of soil on working-organ at which demanded uniformity of depth of crops, H is provided.

Conditions we can express the formula, in the characterizing density of soil of a row-spacing, after pass working-organ

$$\rho = \rho_o \frac{h_1}{h_1 - h_o} \quad (1)$$

Where:  $\rho_o$  — density of soil of a row-spacing after preceding processing, g/sm<sup>3</sup>;

$h_1$  — depth of preceding processing, m;  $h_o$  — depth of immersing сошника, m.

Hence from the formula (1) we can define depth of immersing working-organ

$$h_o = h_1 \frac{(\rho - \rho_o)}{\rho} \quad (2)$$

At following values of density of soil  $\rho = 1,2 \dots 1,3$  g/sm<sup>3</sup>,  $\rho_o = 1,0 \dots 1,1$  g/sm<sup>3</sup> under the formula (2) depth of immersing сошника it is found in limits 2,0 ... 4,0 sm.

Height of wings working-organ we will define from a condition not over turning layers of earth through the bottom part

$$H \geq K_c (h_n + h_o) \quad (3)$$

Where:  $H$  - height of wings сошника, m;  $K_c$  — the factor considering обволакивание heaps of soil;  $h_n$  — average size of height of roughness of a surface of soil, m.

Considering (1) formula, (3) formula we will transform to a following kind

$$H \geq K_c \left[ h_n + h_1 \left( 1 - \frac{\rho_o}{\rho} \right) \right] \quad (4)$$

Being based on researches [2, 291; 3, 124] and the spent experiences at the following sections  $K_c = 1.8$ ,  $h_n = 6 \dots 8$  sm,  $h_1 = 24$  sm,  $\rho_o = 1.0 \dots 1.1$  g/sm<sup>3</sup>,  $\rho = 1,2 \dots 1,3$  g/sm<sup>3</sup> under the formula (4) we find height of wings working-organ, in limits it is not less  $H \geq 14 \dots 18$  sm.

The spent experimental researches in field conditions have shown that the heap of soil before working-organ in cotton row-spacing depends on a soil condition. At humidity of soil there are less than 8–11% and hardness, it is more 1,6–2,0 МПа, after preceding processing the increase in an exit of large fractions and volume of small groups before working-organ was observed. And at humidity of soil within 16–20% reduction of volume of small groups was observed. Preceding from this it is possible to draw a conclusion that for maintenance not over turning soil small groups through wings working-organ its height within 14 ... 18 sm are optimum.

The corner of installation of wings  $\alpha$  in a longitudinal direction of movement working-organ should provide passage of particles of soil with sliding with smaller force of a friction and not envelop a heap of soil in blocks (fig. 1) [3, 124], that is it is necessary to meet a condition

$$\alpha = \frac{\pi}{2} - \phi_c \quad (5)$$

Where:  $\phi_c$  — a corner of an external friction of soil, grad.

The analysis of frictional properties of soils has shown that the corner of an external friction depends on humidity, cleanliness of a surface of wings and specific pressure (fig. 2).

From the presented schedule (fig. 2) it is visible that the size of a corner of a vernal friction from humidity and specific pressure on the average makes 43°. On the basis of this value of a corner under the formula (5) we find a corner of installation of wings in a longitudinal direction of movement working-organ equal  $\alpha = 47^\circ$ .

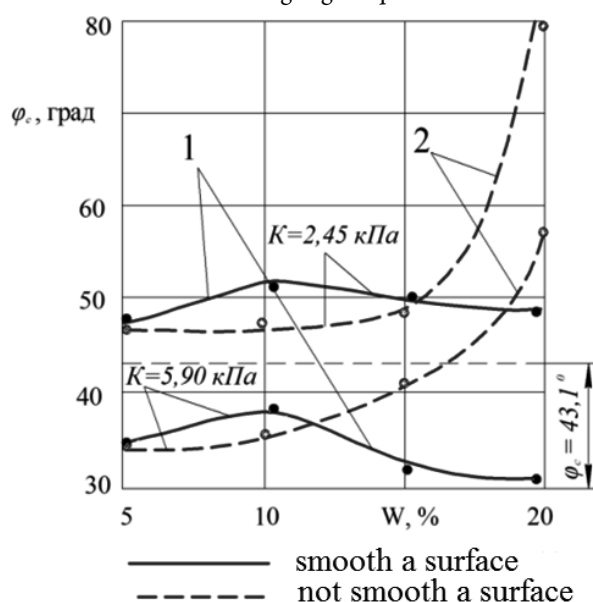


Figure 2. Dependence of a corner of an external friction of soil on humidity and specific pressure

The conclusion that, for maintenance of qualitative crops with the least resistance, a corner of installation of wings in a longitudinal direction of movement working-organ equal  $\alpha = 47^\circ$  is the most favorable.

Corner of a solution of wings working-organ at immersing in soil on depth  $h_0$  the furrow should slightly will be condensed, to be formed a smooth surface of a profile of a bed of a row-spacing. For this purpose the soil should be exposed to easy consolidation (fig. 1). Preceding from it, a corner of a solution of wings working-organ we will prove from the point of view of a choice of the minimum size of a way on which is exposed to expression of a particle of soil. On V.P. Goryachkinu [4, 384] it is known that

$$\operatorname{tg} \gamma = \frac{\operatorname{tg} \alpha}{\operatorname{tg} \omega_c} \quad (6)$$

Usually soil deformation begins on joints of an edge of wings working-organ. If to consider that the profile of a furrow of a row-spacing is located at an angle  $\omega \approx 22^\circ$  and wings are established at an angle in a movement direction working-organ, equal  $\alpha = 47^\circ$  under the formula (6) it is found  $\gamma = \operatorname{arctg} 2,6542$ ;  $\gamma = 69^\circ$

The conclusion that a corner of a solution of wings working-organ, equal  $\gamma = 69^\circ$  is optimum.

For maintenance of steady work, knives working-organ should in regular intervals deepen in soil. For this purpose it is recommended to arrange them on the right and left wings under identical  $\gamma$  a corner, on identical longitudinal and cross-section directions symmetrically, on strokes-lines a6 and 6c (fig. 1).

Distance between knives  $t_c$  it is chosen in dependence of width of distribution of deformation  $b_d$  at interaction of a knife with seed-funnel (fig. 3).

At movement, a knife from a vertical component of traction resistance and gravity of section, plunge into soil, forcing out particles in lateral face. The corner increase  $\alpha_n$  promotes increase in pressing force and appreciable reduction of forcing out force within width of a knife. Thus a corner of immersing of a knife  $\alpha_n$ , a corner of sharpening of a breast  $2\beta'$  and width seed-funnel  $b_s$  are key parameters working-organ.

From schemes (fig. 3) a zone of distribution of width of deformation we will express the formula

$$b_d = b_s + 2h_s \cdot \operatorname{tg} \psi_{\delta-2} \quad (7)$$

At lower case crops before knives it should not be formed covering soils, the distance between knives should be more width of deformation, that is  $t_c > b_d$ .

At values of external diameter seed-funnel  $b_s = 3$  sm, depths of crops  $h_s = 5$  sm, a corner lateral breaking  $\psi_{\delta-2} = 500$  under the formula (7) width of deformation of soil of a row-spacing should be more  $b_d > 14,9$  sm.

Preceding from it the quantity of knives in working-organ will be will be defined in a following order

$$n_n = \frac{B_m}{b_s + 2h_s \cdot \operatorname{tg} \psi_{\delta-2}} \quad (8)$$

Where:  $B_m$  — width of row-spacing of a cotton, m. ( $B_m = 60; 90$  sm).

At values of external diameter seed-passer  $b_s = 3$  sm, depths of crops  $h_s = 5$  sm, a corner lateral breaking  $\psi_{\delta-2} = 500$  under the formula (8) for row-spacing of  $B_m = 60$  sm are recommended to arrange 5 knives, for row-spacing of  $B_m = 90$  sm — of 9 knives at an angle a solution of wings  $\gamma = 69^\circ$ .

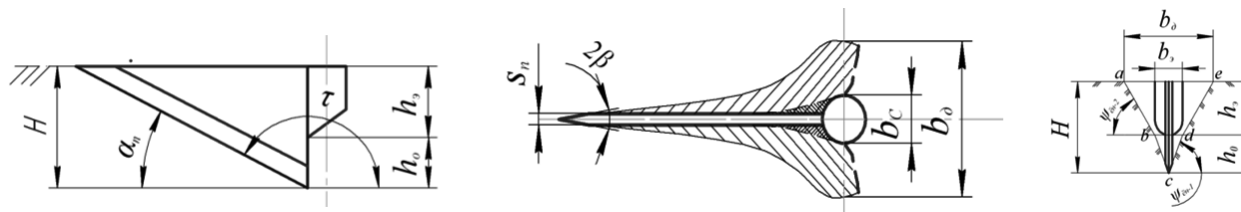


Figure 3. A zone of distribution of deformation from a knife and seed-funnel

Where:  $h_3$  – depth of crops, mm;  $\psi_{6.2}$  – corner lateral breaking, grad;  $b_3$  – width seed-funnel, mm.

Under the received data it is possible to draw a conclusion that for qualitative crops and formation of the form of a bed working-organ should will plunge into soil in limits to 2,0 ... 4,0 sm; for formation of slightly condensed form of a furrow in the course of work should be constantly pressed to a row-spacing surface; to provide not over turning soil small groups through wings work-

ing-organ with optimum height within 14 ... 18 sm; the corner of installation of wings in a longitudinal direction of movement working-organ equal  $\alpha=47^\circ$  is the most favorable; the corner of a solution of wings working-organ, equal  $\gamma=69^\circ$  is optimum; results of researches are introduced in educational process, as the methodical grant for master degree.

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## Development of technology integrated design form a unibody clothing details

**Abstract:** In the article the results of research conducted on the development of technology complex a consistent single-process designing of fabrics and details of garments, including all stages of a single system for design documentation.

**Keywords:** complex designing, formation, weaving, technical project, a sketch and technical projecting, design stages, subsystems, structure designed fabric, integrally form a semi-finished parts of clothing.

The most important condition for the effective functioning of the industry in general is the optimum ratio between its industries, a diversified and balanced development of the vertical and horizontal, in particular, the introduction of new innovative technologies in the design and manufacture of products of light industry [1].

Classical methods of designing and manufacturing clothing from woven materials focused primarily on the use of its production already existing range of fabrics. Nowadays fundamentally new methods of creating clothes, based on an integrated approach

to the design of material for clothes and most clothes, requiring a fundamental change in technology design and creation of fundamentally new equipment for its manufacture. Among them: production of parts and units sewing products a cut from one piece of semi-finished on special equipment using the formability of tissues [2–4], getting integrally of woven garment components directly on the weaving equipment, methods using direct digital printing while receiving fabric, knitted fabrics and details or samples clothes from her and some other [5–9]. These methods are highly efficient



manufacturing clothes, saving raw materials, reduction of numerous manufacturing operations at various stages of production sewing products, the expense of what significantly reduced their labor input and prime cost [10].

The task designing of complex semi-finished products contain a substantial amount of heuristic elements, common methodological recommendations without a precise quantitative description of the parameters, resulting in the need to improve the project as a result of manufacturing products. Development of a new methodology for the design of individual procedures should be based on the systematization, formalization and reliable results of research, composition and structure of a number of factors that influence the design parameters.

Integrated design in our case is kinds of technology, system design, determine the functioning of the system design integrally the formed semi finished of clothing details (IFSCD), as it provides for the consideration of the whole process, from the identification of needs in IFSCD to finished products. The tasks at all stages of the process in accordance with the principles of the system approach are subject to a common goal — to create such a product on the basis

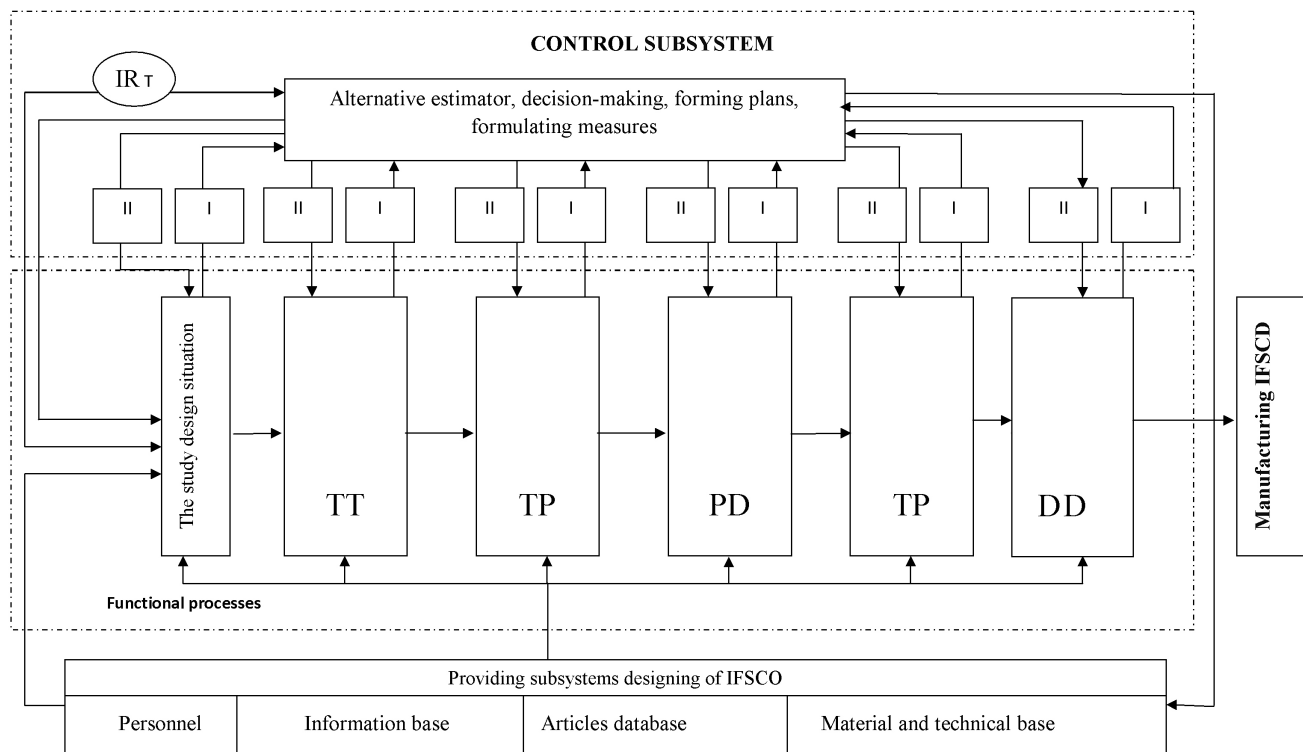
of IFSCD that would ensure maximum satisfaction of consumer demands. Concurrently the minimum production cost of manufacturing should be provided IFSCD:

$$\begin{aligned} \max \min E/y, z/ - n p u \ x \in X; \\ y=Y, x=X \text{ at } x \leq X_0, \end{aligned}$$

where E — the usefulness products of clothing; z — consumer requirements; y — production requirements; X — the parameters of the weaving equipment;  $X_0$  — the existing limitations associated with the possibilities of weaving equipment.

As a result of this task the designer receives the set of feasible solutions satisfying the system constraints, including the possible existence of one or more solutions that provide optimum value E.

This complex multi-objective problem can be solved with the help of System Studies envisaging the construction of a common conceptual model of the process. At the same time, this system will include the main stages of solving design problems and characterization stages, clarifying the functions of each stage of the design process and their further detail, as well as the definition of functional interlink ages between the characteristics and objective functions of the design process in all its stages and for the whole process.



Picture. Conceptual functional-block model of the design process IFSCD

The basis of the separation of the design process IFSCD on stage as well as for the clothes put the typical staging defined by single system design documentation (SSDD). The illustration is a conceptual diagram IFSCD clothing design system, which determines the sequence of the main stages of the design and conditions of interaction of managing and providing subsystems, integrated functional process (look at the picture). The diagrams are adopted following conventions: IR — initial requirements; TT — technical task; TP — Technical proposal; PD — preliminary design; TP — technical project; DD — detailed documentation; block I — assessment of the output parameters of functional processes under; block II — the corrective control action.

The process of designing IFSCD is presented as a set of inter-related stages of decision-making.

Thus, it can be concluded that the task of building a rational structure of the design process IFSCD based on research and analysis developed by graphic relationships presented above has been solved with the help of systems research. At the same time it is planned to build a common conceptual model of the process, clarifying the functions of each stage of the design process and their further detail, as well as the determination of functional relationships between the characteristics and objective functions of the design process in all its phases and for the whole process.

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## Application scaling methods to improve TV images data compression

**Abstract:** In this article, the method of increasing the efficiency of the compression of the video stream compression based on the pre-encoded reduce image size is given. The effect of conversion images into the YUV form to compression efficiency are described in detail. Experimental information of reconstructed images' RMSD is presented. The effect of the aperture on the quality interpolators restore the decimated image and evaluate the effectiveness of their work Some words about LeGall wavelet filter are given.

**Keywords:** image, compression, redundant information, codec, video stream, compression ratio.

When transferring the television broadcast signal into digital form, it is generated digital data stream with a bit rate of about 240 Mbps, for transmission of which the 120 MHz bandwidth links are required transmission links with a bandwidth of 120 MHz. However, standard TV channels have a bandwidth of 8 MHz, so to adjust the signal parameters with the parameters of communication channel special methods of compressing the volume of digital data of audio and video data are used. Moreover, under conditions of given the limited frequency resource it is economically advantageous to transfer by one TV channel as much as possible on one TV channel TV programs, but without any significant deterioration in the quality of image and sound. Therefore,

the efficient compression problem of TV image signals efficient compression TV image signals is has a great practical importance.

Compressing the volume of video data is usually done by removing the redundant information of the following types: code, inter-element or statistical, psycho visual, temporary or structural inter-frame [1]. It should be noted that in the MPEG TV main compression standards MPEG main video compression is achieved by eliminating inter-frame redundancy, as a movie in a single video scene an interframe differences of adjacent frames is, usually small. (Fig. 1). Two adjacent frames (a, b) and their difference (c) are showed in figure 1.

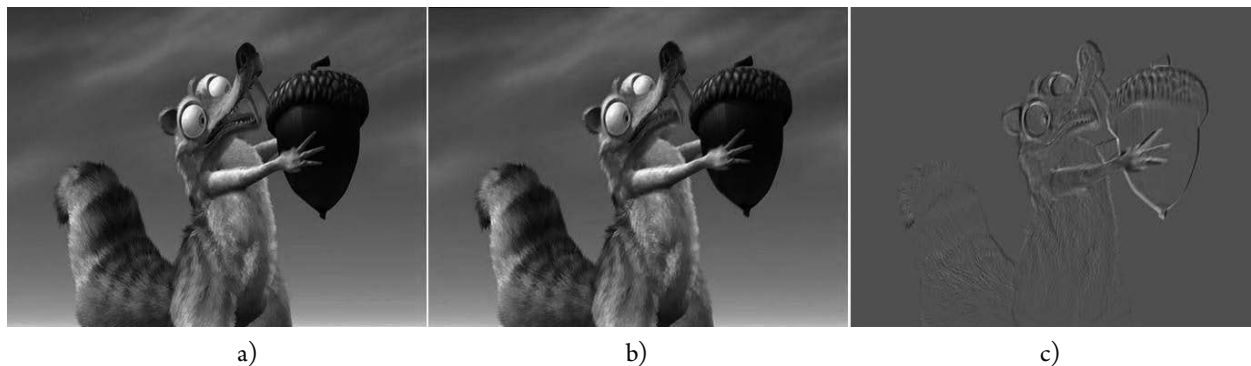


Figure 1. Image 2 of 2 adjacent frames and frame difference; a) first frame b) next frame c) difference of 2 frames

Currently, the MPEG standards inter-frame redundancy is eliminated by motion compensation techniques (MC) based on the search image fragments in the zone of the first frame of the next frame intended displacement. If such fragments are then content block is not transmitted, and instead of new coordinates are transmitted (movement vectors). Thus, for example, 255 bytes, instead

of 16x16 pixel block can be replaced by 1–2 bytes its new coordinates. Thus the video stream structure consisting of a support frame, which is eliminated only intraframe redundancy and one or more types of transmission frames and interframe differences in motion vectors of blocks that is implemented in the MPEG compression standards family and many other codecs.

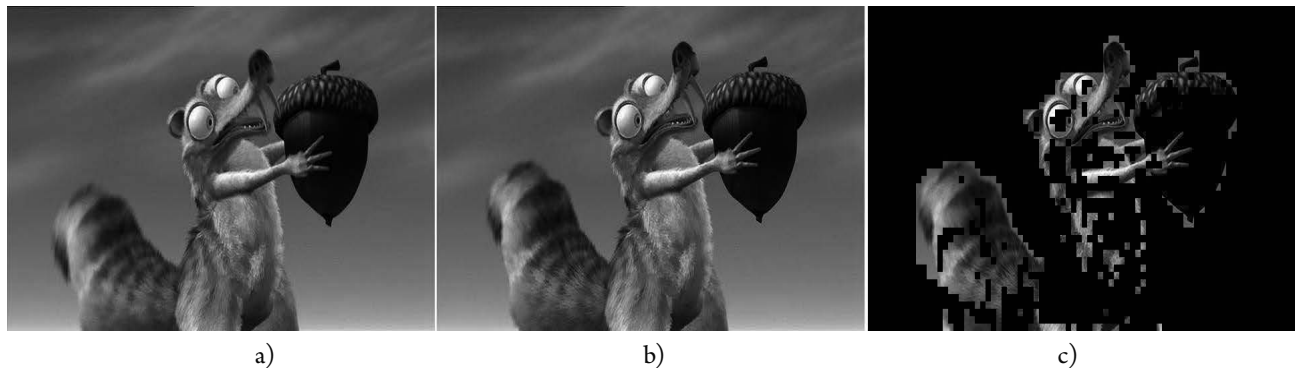


Figure 2. Compensation movement based on movement of the blocks;  
a) first frame b) next frame c) result of the motion compensation

Figure 2 shows an image of adjacent frames (first frame -a and next frame -b) and the result of the motion compensation of their facilities (c), which are subject to transfer only the colored blocks and black values are replaced with their new coordinates. In this case to show the second frame (fig.2, b) it is necessary to transfer only colored blocks of fig.2, c, black blocks values are same with blocks from first frame, that is why they will be restored with them.

The results of these studies have shown that block the MC allows you to transmit with acceptable quality video stream with speeds of 4–5 Mbps, and at lower bit rates the effectiveness of its application falls. So when bit rate of 2 Mbps frame aspect ratio must be more than 130 times with the result that the amount of compressed video and metadata should not exceed 9 Kbytes. Therefore,

to date, such compression ratios on real video scripts can only be achieved at the expense of the loss of image quality.

Therefore, to preserve the visual quality of the decoded images at video compression ratios of more than 80 times, instead of motion compensation is better to use other methods of efficient coding of images, do not use an additional set of data, or to use it only for global motion compensation. In this case, made of flat parallel shifts the entire image to compensate for that motion requires only 2–4 bytes motion vector.

One of such methods that do not use the metadata, can be change the TV image size before compression, which will compress the image with the least loss of quality (Fig. 4).

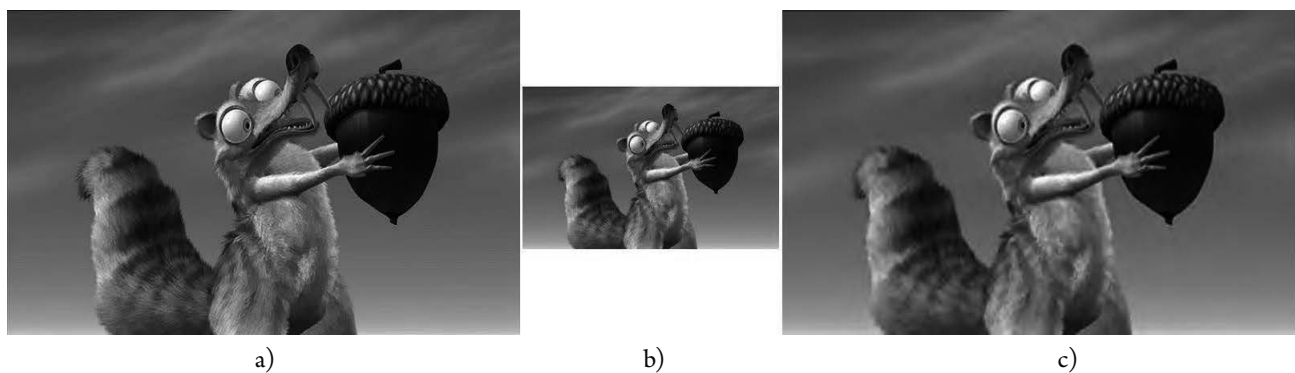


Figure 4. Image compression using the zoom, wherein; a) the original image, b) the reduced image, and c) the restored image

As a final volume of compressed image data depends on the volume of the original image data, if, for example, to reduce the scale 2 times the width and height (Fig. 4b), it will reduce the amount of data and 4 times its volume will decrease accordingly after conventional compression methods. This approach allows a 4 fold increase in the magnitude of the compression video stream, respectively, or to improve the quality of decoded images [4]. However, the effectiveness of pre-scaling applications depends heavily on the choice of an interpolation algorithm.

The fact that for each reduce the size of the images is sufficient to remove even or odd pixel, and the reverse recovery add missing pixels. In practice, for this purpose use interpolation methods based on the calculation of the missing pixel values from known values of pixels around him [5].

The analysis showed that the most widely used methods of bilinear and bicubic interpolation to scale images [4]. They use similar principles of work have a good performance and the quality of the formed images. Differences between these interpolation methods lies in the fact that in the bilinear method, the pixel value is determined by the values of the 4 neighboring pixels, and Bicubic — on 16.

Due to the fact that addition of pixel interpolation is performed based on the average value of surrounding values, it leads to certain errors and distortions in the image structure.

To choose the most effective method of interpolation study was performed to assess the quality reconstructed test images of different scenes with large, medium and small details.

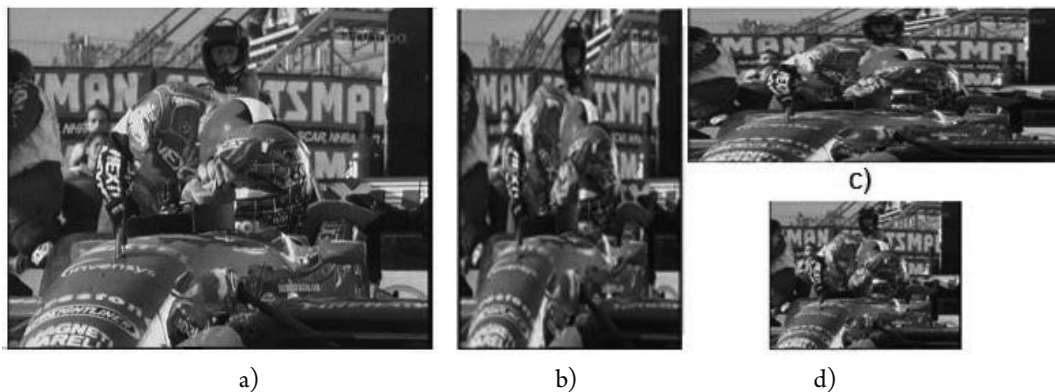


Figure 5. The original image (a) and its scaling options (b — horizontally, c — vertically, d — horizontal and vertically).

In the study, each test image first decimation consistently decreased with decimation in 2 times the horizontally, vertically and vertical in both fields (Fig. 5). And then restored to its original size with algorithms of bilinear, bicubic interpolations and bicubic with interpolator based on the three point LeGall wavelet filter, the lifting the implementation of which is described by the following equation [6]:

$$b_{2i+1} = (b_{2i} + b_{2i+2} + 1) / 2 \tag{1}$$

where,  $b_i$  —  $i$ -brightness value of the pixel column or row.

The quality of the reconstructed images was evaluated, both visually and by calculating the mean square error values of pixels of the original and the reconstructed image. The results of the experimental data on the overall recovery of the images are presented in table (Table 1) as histograms (Fig. 6).

Table 1. – RMSD of image recovery with algorithms bilinear, bicubic interpolations and LeGall wavelet

Nº	Image names	Scaling type	Bilinear,%	Bicubic,%	LeGall,%
1	Rocket-Buran	Vertical	6,1	6,7	5,2
		Horizontal	5,9	6,3	4,8
		Common	8,4	9,9	6,7
2	Water	Vertical	6,3	8,1	6,1
		Horizontal	7,6	8,8	6,6
		Common	10,1	14,1	8,6
3	Formula-1	Vertical	3,3	4	3,3
		Horizontal	3,3	4	3,4
		Common	6	7,8	4,8
4	Mountains	Vertical	14,3	16,4	13,3
		Horizontal	13,1	15,9	11,7
		Common	16,2	16,8	13,2

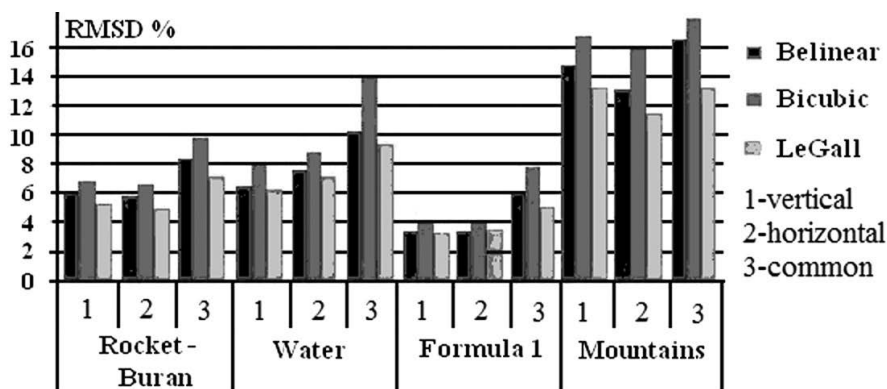


Figure 6. Results of precision recovery pixels thinned test images algorithms bilinear and bicubic interpolation

As we can see in the figure 6 root-mean-square deviations (RMSD) of restored images by the algorithm of bicubic interpolation are the biggest, that means there are many difference between original images and reconstructed. Using common scaling destructs the images 2–4% more than single vertical or horizontal. When we scale and restore the images by using LeGall wavelet algorithm it gives the best results of reconstruction in comparison with bilinear and bicubic interpolators.

As we can see in the figure 6 root-mean-square deviation (RMSD) of restored images by the algorithm of LeGall wavelet gives

the best results of reconstruction in comparison with bilinear and bicubic interpolators.

Experiments showed that reducing the size of original images by 2 times when before encoding allows for large values of video compression significantly reduce the loss of video data quality in the quantizer., and The use of the interpolator on the basis of a wavelet filter LeGall improves the quality of the decoded image, thereby improves the visual quality of the restored images in compression video stream 130 or more times or more.

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## Efficiency wet-heat processing due to the use of composite materials

**Abstract:** The article describes the tools and technological methods of processing parts of garments using composite materials; It shows the parameters of the wet-heat treatment. The recommendations on the choice of forming elements for the manufacture of garments items.

**Keywords:** wet-heat treatment, the composite material, the surface treatment, the matrix, glass cloth, glass mat, breaking load, elongation at break, hardness, wear.

It is known that the main parameters of the wet-heat treatment (WHT) is the temperature ( $^{\circ}\text{C}$ ), the pressure of working bodies (kPa), moisture ( $w$ ), the exposure time of working tools (s). The choice of parameters depends on the WHT fibrous composition, density, color, kind of surface finishing materials of construction for the part of the product. Settings must satisfy the requirements of optimality, realistically achievable in the enterprise and economic requirements.

The requirement is optimal choice of such a combination of WHT parameters within certain ranges, which gives the best results of processing of products. The latest models of equipment for the WHT are equipped with computer software allows for processing at any of the available programs. These tools greatly facilitate the choice of rational combinations of the parameters of the WHT and open up the possibility of centralized management modes on all transactions. It should be noted that one of the important indicators of the quality of the WHT are to maintain the original physical and mechanical properties of tissues and products packages.

However, experience has shown that the methods used by the WHT and the proposed treatment regimens, even in the new, mod-

ern equipment fundamentally do not lead to an increase in the quality of processing of details of clothes.

Studies have shown [1–2] that the application of the existing regimes in the existing WHT equipment leads to a decrease in the basic indicators of physical and mechanical properties of fabrics and packet. It should be noted that indicators such as the breaking load, the abrasion resistance of fabrics and packet products lost their original values by an average of 20–30%.

This provision can be described graphically as follows [3]. The mutual arrangement of warp and weft in the fabric is defined by bending them, namely bending wave height of warp yarns ( $h_o$ ) and weft ( $h_{oi}$ ) and correspondingly the length of their half-waves ( $l_o$  and  $l_{oi}$ ). The height of the bending wave is the distance between the location of the yarn layers of a system in a vertical plane when the warp and weft overlap (Figure 1). Bending length of half-wave warp and weft threads in a single layer or in a layer of the multilayer fabric is determined by the corresponding horizontal distance between two adjacent threads in places of crossing strands in the opposite system.

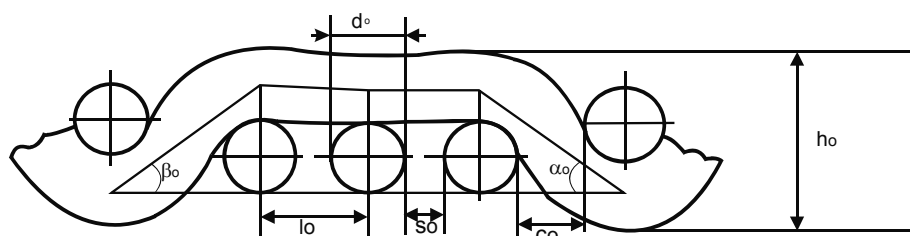


Figure 1. The initial view of the tissue section to a wet-heat processing

If the fabric is exposed to temperature and pressure to plasticize the fibers with moisture, such a tissue surface will differ from the surface of the fabric having undergone not pressed at WHT due to structural changes.

Thus, in the WHT, i. e. under the influence of pressure, temperature and moisture acting as a plasticizer weaken intermolecular bonds filaments of fibers and yarns of the fabric are flattened, they take a different form. As a result, the transverse threads form tissue changes from a circular shape (Figure 1) is transformed into an

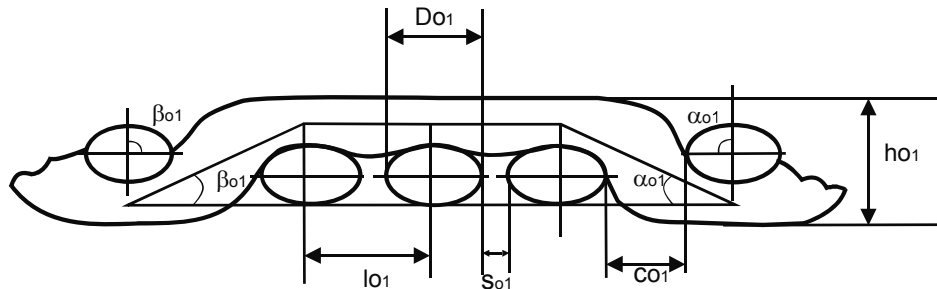


Figure 2. Type of tissue section after WHT

To determine the index of sustainability surveyed tissue tear after wet-heat processing and compression were also conducted laboratory experiments on fabric tensile load by the standard method [4]. Changing the geometry and the physical and me-

chanical properties of the tissue after WHT and compression significantly influenced the tensile characteristics of the tissue. The results of experimental studies on the physical and mechanical properties of the tissue before and after the WHT are listed in the table.

Table 1. – Summary table of the results of experiments on tissue breaking force and elongation at break

Fabric Name	to the WHT (control)		fabric after the WHT	
	on the basis	of the weft warp	on the basis	of the weft warp
Breaking load (N)	239,3	168,6	164,2	135,2
Elongation at break	117,3	186,3	87,5	158,4

chanical properties of the tissue after WHT and compression significantly influenced the tensile characteristics of the tissue. The results of experimental studies on the physical and mechanical properties of the tissue before and after the WHT are listed in the table.

As shown by the analysis of experimental results, the value of the reference values of tissue tensile load to the WHT threads bases on average reaches 239.3 N, and in weft — 168.6 N, and for elongation figures are, respectively, 117.3 and 158.3.

Similar indices of physical and mechanical properties of tissues and WHT after pressing demonstrated that the magnitude of tensile load in warp yarns averages 164.2 H for weft — 135.2 NA in this case reduction properties on the indicator samples is 31, 4% and 19.8% respectively.

The same analysis was performed for tissue elongation. The value of the reference values of tissue elongation after WTO and compression showed that the value for the warp yarn is averaging 87.5 on weft — 158.4. In this case, the reduction properties of this indicator the samples is 25.4% and 14.9% respectively.

To improve the quality of clothing at the WHT transaction details by scientists of the Tashkent Institute of Textile and Light Industry, together with the Bukhara Technological Institute of Engineering and «OFS» by the specialists of the new press equipment airbags have been developed from the perspective of a composite material [5]. At the same time, the pillow was made on the mold

surface, the surface obtained by repeating parts of the product when lying on the plane. Thus, the opportunity to manufacture pillows press equipment for the majority of machined parts and components garment. This cushion is characterized by its lightness, low power consumption, mobility, efficiency, rigidity, strength, etc.

In the manufacture of pillow presses used multi-material, fiber-layered structure consisting of a plastic base reinforced with fillers having a high strength mechanical and thermal stress, resistance to moisture, etc. Our research in the production environment of the company «OFS» in the manufacture of men's outerwear has shown that the proposed technological sparing regimens WHT operations using existing equipment have shown encouraging results.

Thus, on the basis of the above, it can be concluded that the factors and reasonable assumptions about the negative impact of the technological process of the WHT in conjunction molding and pressing onto the fabric in the manufacture of parts of garments have been identified on the basis of the research. It was found that for the purposes of improving the quality of WHT operations using the power saving mode should be used cushion pressure equipment manufactured and composite materials.

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## Stretching curved wooden frame-type elements "Sinch"

**Abstract:** Substantiated the influence of longitudinal forces on the stress state stretched-bent wooden elements of the building frame and update their bearing capacity.

**Keywords:** wood element, a skeleton wooden "Sinch", normal stress, axial force, bending moment, bending stiffness, stability, strength, dynamic impact.

When dynamic effects in the elements of column and "Sinch" wooden frame occurs repeatedly opening and closing knots. At the same time applied to the compressed elements of stretching and tension member to compressive forces. Furthermore the tensile and compressive forces from the walls in the frame having transverse loads. That is, the frame members are in position eccentric compression and stretching.

When calculating the compressed-bent wooden rods to apply the theory of boundary stresses, proposed by prof. K. S. Zavriev. In line with this theory, the bearing capacity of the wooden rod is considered to be exhausted at the time when the edge compression stress becomes equal to the calculated resistance. This theory gives a simple explanation. Since the rigidity of the wood element is not infinite, it is under the influence of bending moment flex. This centrally applied force now will have an eccentricity equal to the deformation of the wooden rod from the moment, and thus creates an additional point of the longitudinal forces, which increases the deformation of the rod, which leads to an even greater increase in additional torque during compression. Such a build-up of additional torque and deflections will continue for some time [1].

Normal stress ( $\sigma_c$ ) in compressed-bent elements is determined by the formula

$$\sigma_c = N / A_{ras} + M_q / W_{ras} (1 - N / N_{kr}) = N / A_{ras} + M / W_{ras} \xi_1 \quad (1)$$

Coefficient  $\xi_1$ , taking into account the additional torque from the longitudinal force in the rod deformation applied at values from 1 to 0 and it is determined by the formula

$$\xi_1 = 1 - \frac{N_j}{N_{kr}}, \text{ here } N_{kr} = \phi R A_{br}$$

And with the impact of vertically directed longitudinal forces, in addition to the bending moment acts centrally applied force, tensile compressed-bent wood element. Therefore, after the deflection element "Sinch" induced bending moment, the normal force will create additional torque of opposite sign and thus will reduce the total bending moment. At this time, stretched-bending elements are calculated without taking into account the additional longitudinal forces at the time of the wooden rod deformation by the formula (2) [2; 3; 4].

$$\sigma_c = \frac{N}{A_{nt}} + \frac{M_q R_r}{W_{nt} R_i} \leq R_r \quad (2)$$

here  $A_{nt}$  — sectional area of the net;  $R_r$ ,  $R_i$  — calculated tensile strength and bending.

This formula can be applied to the wood of the 2nd and 3rd class, and the wood is 1st class, it does not match.

Based on the foregoing, it has been tasked to determine the normal stress with the additional point in the stretched-bent wooden elements. (see Figure 1) [2].

The applied tensile force forms a opposite moment to the bending moment on the lateral loads, ie, decreases the value of the total angular momentum and the formula takes the form of stress (3):

$$\sigma_{r-i} = \frac{N_r}{A_{nt}} + \frac{M_q - N_r \cdot f_{max}}{W_{nt}} \quad (3)$$

here  $M_q$  — moment, produced by shear forces  $q$ ,  $f_{max}$  — maximum deformation of the rod;  $W_{nt}$  — net cross sectional moment of resistance;  $N_r$  — tensile longitudinal force;  $A_{nt}$  — net cross-sectional area;  $\sigma_{r-i}$  — normal tensile stress-bending.

As a result of the bending load  $q$  transverse bending moment is formed, as a result of longitudinal stretching force  $N$  additional bending moment is formed with a negative sign.

We form the expression for the total bending moment at the point  $x$  of the rod (4):

$$M_x = M_q - N_r \cdot y \quad (4)$$

In two (3) and (4) the above equations, there are three unknowns  $\sigma_{r-i}$ ,  $y$ ,  $M_x$ , it is necessary to find another additional equation. Any curve can be theoretically expressed as a number, which in this case must be quickly convergent and satisfy the boundary values. That is a trigonometric series in the following form:

$$y = f_1 \cdot \sin \pi x/l + f_2 \cdot \sin 2\pi x/l + f_3 \cdot \sin 3\pi x/l + \dots$$

Figure 2 shows the interpretation of this series. When balanced load enables the first term of precision equal to 95 to 97% [1]. Then, limited only by the first term of (5), we obtain:

$$y = f_1 \cdot \sin(\pi x/l) \quad (5)$$

However, the above equation has brought one more unknown  $f_1$ .

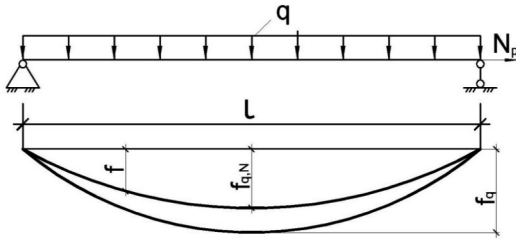


Figure 1. The deflection in the wood element [1]:  $N_p$  — tensile longitudinal force;  $q$  — lateral load;  $f$  — deflection at the intermediate point;  $f_q$  — deflection of lateral load —  $q$ ;  $f_{q,N}$  — deflection from the longitudinal force

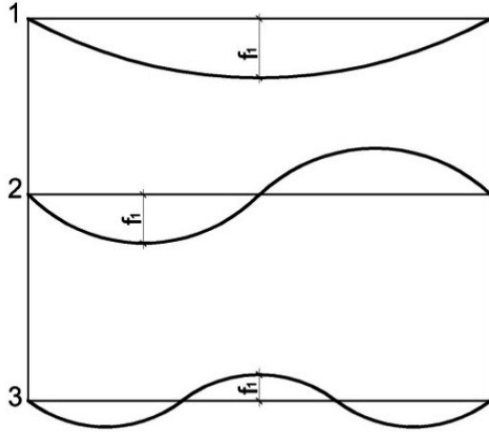


Figure 2. Geometric interpretation of trigonometric series [1]: «  $f_i \cdot \sin(n\pi x/l)$  »: 1, 2, 3 — номера строки;  $f_1, f_2, f_3$  — максимальные ординаты

In the structural mechanics we know that the second derivative of the equation  $y''$  deformation curve is bending moment divided by the rigidity with the opposite sign, ie:

$$\frac{d^2 y}{dx^2} = -\frac{M_x}{EJ} \quad (6)$$

Then after differentiation curve of the equation (5) we get

$$\frac{d^2 y}{dx^2} = -f_1 \frac{\pi^2}{l^2} \sin \frac{\pi x}{l} \quad (7)$$

Equating the value (6.6) and (6.7) we obtain

$$\frac{M_x}{EJ} = f_1 \frac{\pi^2}{l^2} \sin \frac{\pi x}{l} \quad (8)$$

Now, the value of  $M_x$  (8) and  $y$  (5) substitute the expression

(4) and after the conversion, bearing in mind that  $\frac{\pi^2 EI}{l^2} = N_{kp}$ ,

$\sin \frac{\pi x}{l}$  with  $x = \frac{l}{2}$ , where a symmetrical load is the maximum ordinate is the deflection  $y_{max} = f_1$ , is equal to unity, we find that

$$\frac{M_q - N_r \cdot y}{EI} = f_1 \frac{\pi^2}{l^2} \sin \frac{\pi}{2}, \quad M_q - N_r \cdot y = f_1 \frac{\pi^2 EI}{l^2} = f_1 \cdot N_{kr} \cdot M_q = N_r \cdot f_1 + f_1 \cdot N_{kr} = f_1(N_{kr} + N_r) \quad (9)$$

Deflection —  $f_1$  or trough line equation ( $y$ ) can be determined from the following formula:

$$f_1 = \frac{M_q}{N_{kr} + N_r} \quad (10)$$

Given that  $f_1 = f_{max}$ , we get formula for a normal tensile stress bent rod:

$$\sigma_{r-i} = \frac{N_r}{A} + \frac{M_q}{W} - \frac{N_r \cdot M_q}{W(N_{kr} + N_r)} = \frac{N_r}{A} + \frac{M_q}{W} \left( 1 - \frac{N_r}{(N_{kr} + N_r)} \right) \quad (11)$$

Thus, the resulting normal stress in the stretched formula bent-wood elements (11) shows that the tensile strength and bending strength has a magnitude of bending moment decreases, resulting in cross-section, ie.:

$$\sigma_{r-i} = \frac{N_r}{A} + \frac{M_r}{W} \left( 1 - \frac{N_r}{(N_{kr} + N_r)} \right) \quad (12)$$

As a result of simplifying the formula takes the following form:

$$\sigma_{r-i} = \frac{N_r}{A_{nt}} + \frac{N_{kr} \cdot M_q}{W_{nt}(N_{kr} + N_r)} \quad (13)$$

Introducing the notation  $\frac{N_{kr}}{N_{kr} + N_r} = \xi_r$ ,

$$\text{we get } \sigma_{r-i} = \frac{N_r}{F_{nt}} + \frac{M_q \cdot \xi_r}{W_{nt}} \quad (15)$$

here  $N_r$  — longitudinal force;

$F_{nt}$  — net cross-sectional area;

$W_{nt}$  — net cross sectional moment of resistance;

$M$  — bending moment;

$R_r$  — calculated resistance of wood stretching along fibers.

For pine and spruce: a) elements of rectangular section (except as specified in sub-paragraphs “b”, “c”) 50 cm in height and:  $\xi_r = 0,71$  — for first-class, 0,54 — second-class; b) elements of rectangular cross section width of more than 11 to 13 cm at the height of the cross section of more than 11 cm:  $\xi_r = 0,67$  — for first-class, 0,5 — for second-class; c) rectangular elements of a width of more than 13 cm in cross-section height of more than 13 cm:  $\xi_r = 0,625$  — for first-class, 0,47-for second-class [2].

Having mean that  $N_r = R_r A_{nt}$  and  $N_{kr} = \frac{\pi^2 EI}{l_0^2}$  (16)

$$\xi_r = \frac{1}{1 + \frac{N_r}{N_{kr}}} = \frac{1}{1 + \frac{R_r \cdot A_{nt}}{\pi^2 \cdot EI}} = \frac{1}{1 + \frac{R_r \cdot A_{nt} \cdot l_0^2}{\pi^2 \cdot EI}} \quad (17)$$

$\xi_r$  — coefficient varying from 1 to 0, taking into account the additional torque from the longitudinal force due to the deflection element, defined by the formula

$$\xi_r = \frac{1}{1 + \frac{R_r \cdot A_{nt} \cdot l_0^2}{\pi^2 \cdot EI}} \quad (18)$$

here  $l_0$  — effective length of the element;

$\pi = 3,14$ ;

$EI$  — flexural rigidity element.

Then for pine and spruce for the values of  $E = 10^4 \text{ MПа}$ ,  $\pi = 3,14$ ,  $R_p = 10 \text{ MПа}$ ,  $l = 4 \text{ м}$  respectively equal to  $\xi_r = 0,67$ . For poplars:  $E = 10^4 \text{ MПа}$ ,  $\pi = 3,14$ ,  $R_p = 8 \text{ MПа}$ ,  $l = 4 \text{ м}$  respectively equal to  $\xi_r = 0,72$ . Accounting for the additional factor will provide an opportunity to save of wood used in load-bearing timber constructions.

On the data longitudinal tensile forces, “Sinch” elements do not work nearly as well as the traditional wood-frame houses used nail connections, hinged connection — “Turm” without mechanical linkages.

Based on the above, in terms of improving the structural and seismic safety, it is possible to make the following recommendations and suggestions:



1. The elements of wood-sinchevyh houses erected in seismic zones, the use of traditional connecting "Turn" type units (drills) — is not enough, because in terms of tensile and shear loads Sinchi elements may be destroyed.

2. Therefore it is recommended to install in knots metal mechanical connections such as clamp, bolt, screw, etc., That will strengthen resistance to opening the cells and the appearance of residual deformations in the plastic timber frame elements.

3. Currently, according to QMQ2.03.08–98, the calculation of

timber frame elements (paragraph 4.16), are in conditions of bending and stretching is done taking into account the factor  $\xi_r = \frac{R_r}{R_i}$ ,

which gives approximate values for any type of wood. Offered in the coefficient  $\xi_r = \frac{1}{1 + \frac{R_r \cdot A_{st} \cdot l_0^2}{\pi^2 \cdot EI}}$  allows to obtain more accurate re-

sults, taking into account the rigidity of stretched-bent wood framing members.

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## Modeling two-dimensional unsteady movement of flow, constrained by control structures

**Abstract:** The article describes the implementation of the model of two-dimensional unsteady movement of flow constrained by a combined dam on the basis of vector-matrix form of Saint-Venant equation in curvilinear coordinates.

**Keywords:** control structures, modeling, Saint-Venant equation, curvilinear coordinates, isoparametric transformations, boundary conditions, approximation, boundary and initial conditions, finite element method, algebraic equations, algorithm.

**Introduction.** Bank scouring annually causes significant damage to the economy of Uzbekistan. Annually over 30 billion sums are allocated for bank protection and flood control works. Vast amount of funds are spent for reclamation work to eliminate emergency situations occurring as a result of existing dam breaks at Amudarya and Syrdarya rivers and their tributaries.

On the other hand the construction of large water reservoir hydrostructure systems at the main tributaries of the above rivers, Vahsh and Naryn, can result in lowering of water level for the existing non-dam water intake and respectively lower withdrawn discharge for large irrigation canals of the region.

Therefore protection and channel control works are being held at the heads of canals, dive culverts, aqueducts, at river port through

Termez and etc.

The main reasons for emergency situations and damages of protection and control structures (blank, through-flow and combined) are their imperfect structure and the methods of their calculation and design, associated with wrong prediction of channel reformation after their installation in river channel or floodplain.

In present, the justification of these protection structures is carried out mainly for steady-state conditions. Our proposed modeling method allows for justification of these structures on the basis of numerical experiments by the mathematical model [1] of two-dimensional unsteady movement of flow constrained by control structures.

**Modeling.** Inputting curvilinear coordinates  $x = x(\xi, n)$ ,  $y = y(\xi, n)$  and determining isoparametric transformation ele-

ments [2] into main Saint-Venant equation [1,2] and after simple algebraic transformations we get the following vector-matrix equation in curvilinear coordinates.

$$\frac{\partial \mathbf{V}}{\partial t} + \mathbf{A}^{\xi\eta}(\mathbf{V}) \frac{\partial \mathbf{V}}{\partial \xi} + \mathbf{B}^{\xi\eta}(\mathbf{V}) \frac{\partial \mathbf{V}}{\partial \eta} + \mathbf{D}^{\xi\eta}(\mathbf{V}) = 0 \quad (1)$$

where

$$\mathbf{V} = \begin{pmatrix} h \\ p^\xi \\ p^\eta \end{pmatrix}, \quad \frac{\partial \mathbf{V}}{\partial \xi} = \begin{pmatrix} \frac{\partial h}{\partial \xi} \\ \frac{\partial p^\xi}{\partial \xi} \\ \frac{\partial p^\eta}{\partial \xi} \end{pmatrix}, \quad \frac{\partial \mathbf{V}}{\partial \eta} = \begin{pmatrix} \frac{\partial h}{\partial \eta} \\ \frac{\partial p^\xi}{\partial \eta} \\ \frac{\partial p^\eta}{\partial \eta} \end{pmatrix}, \quad (2)$$

$$\mathbf{D}^{\xi\eta}(\mathbf{V}) = \begin{pmatrix} gh \left( \xi_x \frac{\partial z_0}{\partial \xi} + \eta_x \frac{\partial z_0}{\partial \eta} \right) + gn^2 \frac{(\eta_y p^\xi - \xi_y p^\eta) \left( (\eta_y p^\xi - \xi_y p^\eta)^2 + (\eta_x p^\xi - \xi_x p^\eta)^2 \right)^{1/2}}{J^2 h^{7/3}} \\ gh \left( \xi_y \frac{\partial z_0}{\partial \xi} + \eta_y \frac{\partial z_0}{\partial \eta} \right) + gn^2 \frac{(\eta_x p^\xi - \xi_x p^\eta) \left( (\eta_y p^\xi - \xi_y p^\eta)^2 + (\eta_x p^\xi - \xi_x p^\eta)^2 \right)^{1/2}}{J^2 h^{7/3}} \end{pmatrix} \quad (5)$$

Boundary conditions in the system of curvilinear coordinates are written out:

the depth change or discharge change in the liquid part of the boundary is inputted

$$h = H, \quad (\xi, \eta) \in d\Omega_{\kappa 2} \quad (6)$$

$$(-\eta_x \cos \alpha + \eta_y \sin \alpha) p^\xi + (\xi_x \cos \alpha - \xi_y \sin \alpha) p^\eta = JQ \quad (7)$$

$$\alpha = \hat{\alpha}(n, O\eta), \quad (\xi, \eta) \in d\Omega_{\kappa 1}$$

for the solid part of the boundary it is given as

$$(-\eta_x \cos \alpha + \eta_y \sin \alpha) p^\xi + (\xi_x \cos \alpha - \xi_y \sin \alpha) p^\eta = 0, \quad (8)$$

$$\alpha = \hat{\alpha}(n, O\eta), \quad (\xi, \eta) \in d\Omega_{\tau i} \quad i = 1, 2$$

or in the operator form

$$\mathbf{E}_i \mathbf{V} = \mathbf{F}_i, \quad (\xi, \eta) \in d\Omega_i, \quad i = 1, \dots, n \quad (9)$$

Using implicit scheme of approximation in time, we obtain the following steady-state equation to determine:

$$\mathbf{V}^{k+1} + \mathbf{A}^{\xi\eta}(\mathbf{V}^k) \tau \frac{\partial \mathbf{V}^{k+1}}{\partial \xi} + \mathbf{B}^{\xi\eta}(\mathbf{V}^k) \tau \frac{\partial \mathbf{V}^{k+1}}{\partial \eta} = \mathbf{V}^k - \mathbf{D}^{\xi\eta}(\mathbf{V}^k) \tau, \quad (10)$$

$(x, y) \in \Omega, \quad k = 1, 2, \dots$

Initial conditions,

$$\mathbf{V}^0 = \mathbf{V}_0, \quad (x, y) \in \Omega, \quad (11)$$

By discretizing the boundary conditions we obtain

$$\mathbf{E}_i^k \mathbf{V}^{k+1} = \mathbf{F}_i^k, \quad (\xi, \eta) \in d\Omega_i, \quad i = 1, \dots, n \quad (12)$$

**Numerical solution algorithm.** As the algorithm for numerical solution of the equation (10) we use the finite element method on the basis of Galerkin-Petrov scheme [3; 4; 5; 6; 7].

1. Triangular or rectangular elements are taken as finite elements for two-dimensional design field, and the rectangular element can be divided into two rectangular ones through diagonal. Dividing into elements must meet the requirements, and adjacent elements must have common sides and common enumerated nodes.

Domain of determination of  $\Omega$  variables is divided into  $N$  finite subdomains  $\Omega_i$  ( $i = 1, 2, \dots, N$  (for instance, irregular triangles and rectangles, having areas of the same order), so that  $\bigcup_{i=1}^N \Omega_i, \Omega_i \cap \Omega_j = 0$ ,

for  $i \neq j$  and then we move to isoparametric coordinates using bilinear

$$\mathbf{A}^{\xi\eta}(\mathbf{V}) = \begin{pmatrix} 0 & \xi_x + \xi_y & 0 \\ -\frac{p^2}{h^2} + gh & \frac{2p}{h} \xi_x + \frac{q}{h} \xi_y & 0 \\ -\frac{pq}{h^2} & \frac{q}{h} \xi_x & \frac{2q}{h} \xi_y + \frac{p}{h} \xi_x \end{pmatrix}, \quad (3)$$

$$\mathbf{B}^{\xi\eta}(\mathbf{V}) = \begin{pmatrix} 0 & \eta_x + \eta_y & 0 \\ -\frac{pq}{h^2} & \frac{2p}{h} \eta_x + \frac{q}{h} \eta_y & \frac{2p}{h} \eta_x + \frac{p}{h} \eta_y + \frac{q}{h} \eta_y \\ -\frac{q^2}{h^2} + gh & 0 & \frac{q}{h} \eta_x + \frac{p}{h} \eta_x + \frac{2q}{h} \eta_y + \frac{p}{h} \eta_x \end{pmatrix}, \quad (4)$$

transformation;

2. Target function values, which are unknown values and are subject to be determined, are fixed in enumerated nodes.

3. Basis  $\{\varphi_i(\xi, \eta)\}$  and  $\{\psi_i(\xi, \eta)\}$  are chosen — for subdomains  $\Omega_j$

4. Basis for elements are chosen from approximation criteria

5. Second basis  $\{\psi_i(\xi, \eta)\}$  is chosen as characteristic function of domain  $\Omega_j$ :

$$\psi_i(\xi, \eta) = \begin{cases} 1, & (\xi, \eta) \in \Omega_j, \\ 0, & (\xi, \eta) \notin \Omega_j. \end{cases} \quad (13)$$

6. Approximate solution  $\mathbf{V}^{jk+1}(\xi, \eta)$  is searched in the following form:

$$\mathbf{V}^{jk+1}(\xi, \eta) = \sum_{i=1}^{n_j^i} \mathbf{Q}_i^{jk+1} \phi_i^j(\xi, \eta); \quad (14)$$

where  $\mathbf{Q}_i^{jk+1} = \begin{pmatrix} h_i^{jk+1}, & 1, \dots, n_i^j \\ p_i^{\xi, jk+1}, & 1, \dots, n_i^j \\ p_i^{\eta, jk+1}, & 1, \dots, n_i^j \end{pmatrix}$  — vector-matrix of the unknown

coefficients and the amount of function in element approximations in the variable determination domain and  $\phi_i(\xi, \eta)$  — linear and quadratic basis functions in triangle and rectangle [3,8].

7. In order to determine coefficients  $\mathbf{Q}_i^{jk+1}$  at all points of variable determination domain the following system of equations is used:

$$\left( \mathbf{V}^{k+1} + \mathbf{A}^{\xi\eta}(\mathbf{V}^k) \tau \frac{\partial \mathbf{V}^{k+1}}{\partial \xi} + \mathbf{B}^{\xi\eta}(\mathbf{V}^k) \tau \frac{\partial \mathbf{V}^{k+1}}{\partial \eta} - \mathbf{V}^k + \mathbf{D}^{\xi\eta}(\mathbf{V}^k) \tau, \quad \psi_j \right), \quad j \in N_{\text{en}} \quad (15)$$

$$\sum_{i=1}^n (\mathbf{E}_i^k \mathbf{V}^{k+1} - \mathbf{F}_i^k, \quad \psi_j), \quad i \in N_{\text{sp}}^i \quad (16)$$

or

$$\iint_{\Omega_j} \left( \mathbf{V}^{k+1} + \mathbf{A}^{\xi\eta}(\mathbf{V}^k) \tau \frac{\partial \mathbf{V}^{k+1}}{\partial \xi} + \mathbf{B}^{\xi\eta}(\mathbf{V}^k) \tau \frac{\partial \mathbf{V}^{k+1}}{\partial \eta} - \mathbf{V}^k + \mathbf{D}^{\xi\eta}(\mathbf{V}^k) \tau \right) \partial \omega_j = 0, \quad (17)$$

$j \in N_{\text{en}}$

$$\sum_{i=1}^n \int_{d\Omega_i} (\mathbf{E}_i^{\xi\eta}(\mathbf{V}^k) \mathbf{V}^{k+1} - \mathbf{F}_i^{\xi\eta k}) \partial \omega_j = 0, \quad i \in N \quad (18)$$

where  $(u, v)$  — scalar product,  $i$  — number of boundaries in  $j$ -th element,  $n$  — number of nodes of  $j$ -th element, included in domain

boundary, matrix elements  $\mathbf{E}$  and  $\mathbf{F}$  are determined with boundary conditions by of the equations (12) at the boundary  $d\Omega_i$ . Matrices  $\mathbf{A}$ ,  $\mathbf{B}$ ,  $\mathbf{E}$  and vectors  $\mathbf{D}$ ,  $\mathbf{F}$  for equations and boundary conditions [1] are used instead of matrices  $\mathbf{A}^{\xi\eta}$ ,  $\mathbf{B}^{\xi\eta}$ ,  $\mathbf{E}^{\xi\eta}$  and vectors  $\mathbf{D}^{\xi\eta}$ ,  $\mathbf{F}^{\xi\eta}$  if the equation is used with main coordinates.

8. Putting solutions into the equation and solving integrals, we obtain matrix system of algebraic equations for each element node and by linearizing by quasilinearization we obtain the following:

$$\mathbf{G}_i^{jk} \mathbf{Q}_i^{jk+1} = \mathbf{U}_i^{jk+1} \quad j \in N_j^{out} \quad (19)$$

$$\mathbf{R}_i^{jk} \mathbf{Q}_i^{jk+1} = \mathbf{T}_i^{jk+1} \quad j = 1, \dots, N_j^{in} \quad (20)$$

where  $\mathbf{G}_i^{jk}$  и  $\mathbf{U}_i^{jk+1}$  matrices for coefficients obtained as a result of numerical integration.

9. By grouping and combining matrix elements  $\mathbf{G}_i^{jk}$  and  $\mathbf{R}_i^{jk}$ ,  $\mathbf{U}_i^{jk}$  and  $\mathbf{T}_i^{jk}$  we obtain the system of linear algebraic equation with global matrices and vectors:

$$\mathbf{K}^k \mathbf{Q}^{k+1} = \mathbf{F}^{k+1}, \quad (21)$$

where  $\mathbf{K}^k$  и  $\mathbf{F}^{k+1}$  — global matrices and vectors with sizes equal to the amount of nodes.

10. Solving the system of equations on the basis of finite-difference method we obtain the function  $Q^j(t)$  for all nodes of the net. Then we move over to the main variables using inverse isoparametric transformation and obtain final solution, which determines the values for the initial function at any point of finite elements.

11. Then the clauses 6–9 are repeated for further steps in time.

The initial data is presented in the form of database on MICROSOFT ACCESS relational database, and the algorithm is carried out in the form of enquiries and program modules, developed in ACCESS BASIC language for Pentium computers using principles of structural programming.

**Results and discussion.** At the left side of rectangular channel discharge change liquid border is taken for boundary conditions and the boundary conditions at the right side is the change of water level 4.0m. The boundary conditions for blank part are taken for solid border. Carrying capacity and the type of build-up is taken into consideration for through-flow part [9; 10].

At the beginning of the numerical experiments the initial conditions are accepted, so that the velocity components are equal zero and the elevation of water is 4 m. The boundary conditions are as follows: water from the left border comes uniformly with along channel width with steady discharge of 0.8 m<sup>3</sup>/s, and at the end of channel it is supported by permanent 4.0 m. There is an occurrence of water flow parameter changes. Modeling of unsteady water motion at the given channel reach was carried out with time interval of 5 seconds during total of 2 hours.

Picture 1 — a, б, в and г show velocity profiles at time moment of 120 seconds after the beginning of the process and for almost steady condition (the last picture) for case with combined spur dike, correspondingly.

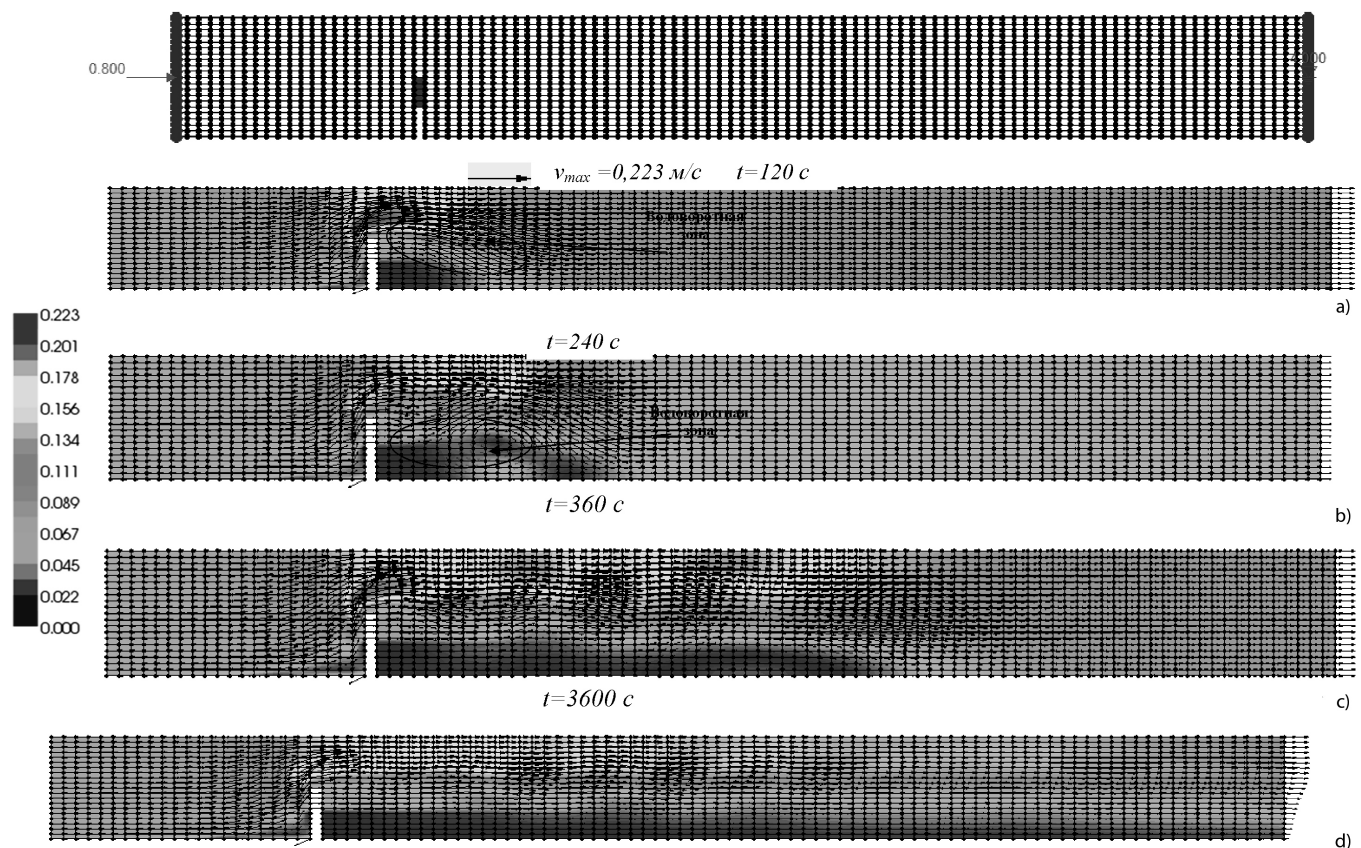


Figure 1. Channel rectangular reach with combined straight spur dike

The scales for water flow velocities are at the left of the pictures. The pictures show the change of water flow velocity profiles in time along the channel length and width and the change of vortex zone beyond the dike, which changes in time along the channel length.

**Conclusions**

1. Usage of finite element method in water flow modeling gives the opportunity to model the operation of control structures for

unsteady flow regime, to determine the quantitative and qualitative flow characteristics along the length, width of river channel or river reach, and also allows to determine design parameters for control structures.

2. Upon modeling we can check operation regime of built control structures during the operation period in case of occurrence of unsteady flow motion.

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## Basis of saw updating of gin feeder in order to improve purifier effect

**Abstract:** To create a new design of technological machines on the basis of a study of the dynamics of machine units, must be new technical solution taking into account the internal and external loads. This article provides mathematical models of cotton movement inside the drum of the feeder. Represented by the formula for determining the length of the drum pegs. Differential equations allows to obtain patterns of change in drum speed, taking into account the dissipative properties of the transmission, allows to define rational values of the dynamic parameters of drives.

**Keywords:** Gin, feeder drum, sheet, feed, screw, roller, soft impurities, material fabric tension, cotton.

The feeder is included in the overall Gin set installation and provides equable feed of raw cotton in the working chamber of gin, a thorough loosening and additional purifying it from trash before the ginning process. By appointment in the process technological

feeders are divided into feeders and purifying of feeders cleaners raw cotton from small and large sort, in terms of volume of working drums on the single drum and multi drum.

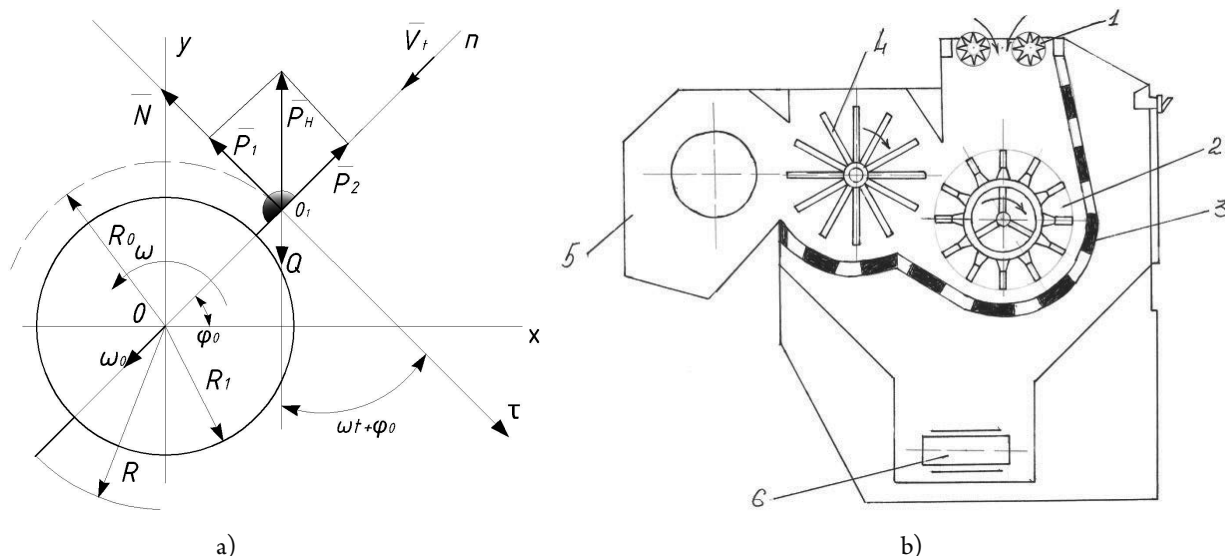


Figure 1. Feeder raw cotton and cotton design scheme of movement on the surface of the drum chopping

Single Drum feeders are intended mainly for loosening and uniform feed of the cotton gin in the working chamber. Construction of single-drum feeders are simple on the device, easy to maintain and repair, but they have a cleansing effect on the small litter only 5–6% [4].

The following technological requirements are put in Saw gin Feeders raw cotton before entering the working chamber of gin should be loosened up its primary structural components — the lobules and sheets; in its composition should not life tramp will take; cotton flow supplied to the working chamber gin must have a high degree of uniformity both in time and in the width of the feeder, a feeder should not be fiber formation defects, crushed seeds and care in sheet litter.

To ensure the above indicators we are proposed modernized peg drum feeder [1; 2; 6].

The construction of feeders which is proposed to us works as follows. Raw cotton with distributional shaft is directed to the mine shaft, it becomes the gin feeder. The feed rollers 1, whereby the rotation toward each other from the feeding mechanism, grasp the cotton out of the mine evenly fed it to the receiving pegs drums 2, which loosen cotton, drags his net surface 3, cleans raw cotton from small trash and supplies its outlet drum 4. Last completing drum 4 serves as a soft trap impurities. Structurally, it is a tree with a diameter of 50–70 mm with radial special pegs. The composition of raw cotton in addition to large and small litter are accidentally trapped while collecting it impurities (pieces of cloth of polyethylene, etc.) The latter, penetrating into the mass of cotton, its special long pegs engage the soft impurities which are wound onto the shaft of small diameter and cleaned periodically. Trash isolated mesh surface through holes are collected at the bottom of the housing and output feeder conveyor 6 weed out. On the tray 5 seed cotton gin sent to the working chamber.

To study the process of cleaning raw cotton accidentally caught by soft contaminants we studied theoretical model of the motion of impurities on the surface of the drum chopping. For carrying out tissue on the surface of the drum chopping occurs forces the tension  $P_H$ , which has two components  $P_1, P_2$  on the curved surface of the peg. Based on the theoretical model can obtain the following differential equation [3; 5].

$$m\ddot{s} = \frac{P_H [R_0 - S - R_0 - \sin \omega_0(t)]}{\sqrt{R_0 - S - R}} \quad (1)$$

$$m\ddot{s} = \frac{P_H [R_0 - S - R_0 \sin \omega_t(t)]}{\sqrt{R_0 - S - R \sin \omega_t(t)}} =$$

$$= \frac{P_H f_1 \sin \omega_t(t)}{f} [\exp(f\phi_0 - f)] - m(R - S)\omega^2 \quad (2)$$

Where;

$f_1$  -coefficient of friction between the fabric and peg;

$f$  - the coefficient of friction between the yarn and cotton fiber;

$\omega$  - frequency drum speed.

After the solution of the equation (2) numerical method when  $f = 0.25$ ,  $\alpha = \pi$ ,  $m = 0.12g$ ,  $R = 0.25$  m we obtain the following relationship

Analyzing the received payments you may choose the length of drum.

When designing peg drum is important to ensure their balance, as well as the necessary strength and stiffness of its parts, the shaft and Pegs strap.

Location of the drum details as in its design must be such as to be statically and dynamically balanced. Due to manufacturing and assembly errors and heterogeneity of the material, in most cases drums are unbalanced, that at their considerable weight and high corner velocities can cause not only additional harmful stress on the

bearings and vibration entire feeder, and this will result in first temporary wear and breakages. However, the studies showed that non-uniformity of the rotation reels peg not only leads to breakdowns, but also reduces the ability of the trap drum, and also reduces the purifying effect of the feeder. In this connection, to detect changes in the load on the working bodies, at the same time we are studied the dynamics of rotating bodies with allowance for dissipative transmission characteristics at one time.

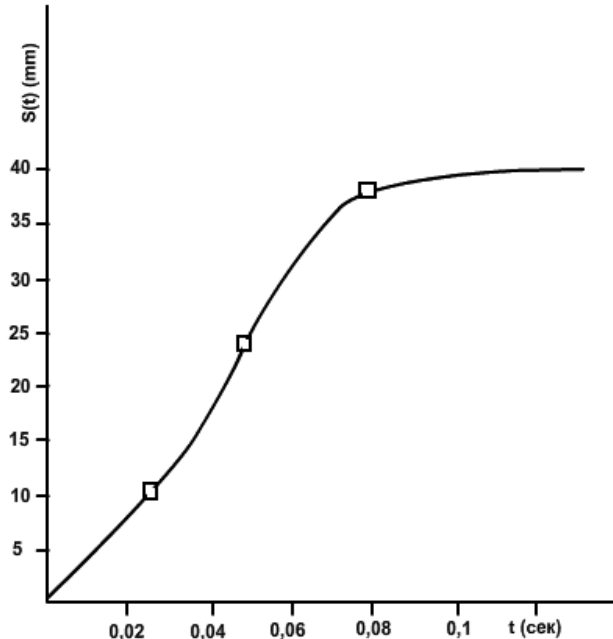


Figure 2. Curve determining tissue displacement since the value of the tension force  $P_1 = 1.2$ ,  $P_2 = 0.046H$

Design scheme for studying the variation in the rotation of working bodies in view of the mass movement of cotton inside the feeder is shown in Figure 1 (b). Movement of cotton inside the feeder consists of six parts. Of these, the first, third and fifth peg occur on the surface of the drums, and the second, fourth and sixth — with a margin of peg drums.

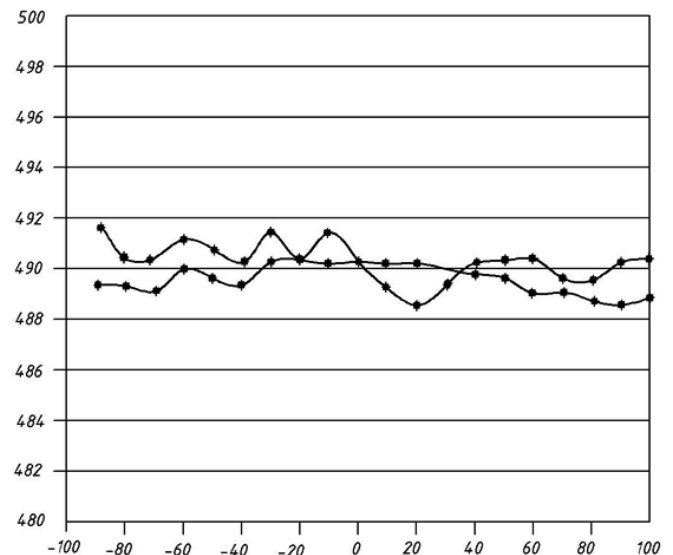


Figure 3. Diagram of changing rotation frequency of peg drums

Based on the calculated differential scheme composed equation movement on the surface of cotton peg drum (2).

In solving the equations (3) and (4) used a numerical method of Runge-Kutta method for the second order differential equation

of the form  $S = \frac{d^2 s}{dt^2} = F(t, s, \dot{s})$ . After solving equation of numerical methods we obtain charts (Figure 3)

$$\left. \begin{aligned} \frac{d^2 \chi}{dt^2} &= -\frac{(K^v \cdot g_x^{k^2}) \cdot \sin(\phi_1)}{m} \\ \frac{d^2 \chi}{dt^2} &= -\frac{(K^v \cdot g_x^{k^2}) \cdot \sin(2 \cdot \pi - \phi_1)}{m} \end{aligned} \right\}$$

where  $K_{mp}$  — the coefficient of friction between the cotton and the drum pegs;

$K^v$  — coefficient proportionality;

$\phi_0$  and  $\phi_1$  — the angle of the capture and dumping of cotton groves drum;

$\omega$  — peg drum speed,  $s^{-1}$ ;

$m$  — cotton weight, kg;

$R$  — peg drum of radius, m;

$$S = \frac{d^2}{dt^2} = K_{mp} \cdot \left[ \frac{K^v \cdot (\omega \cdot R)^2}{m} + 2 \cdot \omega \cdot S + g \cdot \sin(\omega \cdot t + \phi_0) \right] - \frac{S^2}{r^2} - g \cdot \cos(\omega \cdot t + \phi_0) \quad (3)$$

$$\left. \begin{aligned} \frac{d^2 y}{dt^2} &= -\frac{(K^v \cdot g_y^{k^2}) \cdot \cos(\phi_1)}{m} - g \\ \frac{d^2 y}{dt^2} &= -\frac{(K^v \cdot g_y^{k^2}) \cdot \cos(2 \cdot \pi - \phi_1)}{m} - g \end{aligned} \right\} \quad (4)$$

$g$  — acceleration of gravity,  $m/s^2$ ;

$t$  — time s;

#### Conclusion

On the basis of the analysis of the research results it is found that, for effective work drum feeder, which provides its trapping ability of soft contaminants and uniform supply of cotton to the working chamber a given performance, one must reduce irregular rotation peg drum by optimizing the elastic-dissipative parameters transmission.

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## Investigation of methods of preparation of cotton and its components for storage

**Abstract:** This article discusses the regulation of the process of technical preparation of seeds to send oil mills. Regulations is applicable technical measures for the preservation of quality of seeds on the cotton oil mills. There is expressed the most important physical-mechanical properties of microhardness peel. The results of theoretical study on heat and mass transfer in order to analyze the possibility of an intensification of the uniformity of the heating and drying of raw cotton components.

**Keywords:** Cotton fibers, polyester, moisture, seeds, oil, drum dryer, peel, core, micro-hardness, heat treatment.

As everyone knows that cotton is the most useful products in the world. It is breathable, hypoallergenic, soft to touch, comfortable for body, rather warm, absorbs moisture, easily bleached, not electrified. Sometimes as an addition it is added an artificial fibers, such as polyester or lycra [1; 4].

Four species (*Gossypium arboreum*, *Gossypium barbadense*, *Gossypium herbaceum*, *Gossypium hirsutum*) of cotton began in-

dependently used for textile production. In general, since the beginning of the XX century took place in employment drop in the cotton industry due to the development of mechanization. Today, cotton remains as one of major export goods in many countries (Table 1) and a large part of the annual cotton harvest is long staple cotton [2].

Table 1. – Top 10 Cotton Producing Countries (in metric tonnes)

Rank	Country	2010	2012	2014
1	China	5,970,000	6,281,000	6,532,000
2	India	5,683,000	6,071,000	6,423,000
3	United States	3,941,700	3,412,550	3,553,000
4	Pakistan	1,869,000	2,312,000	2,308,000
5	Brazil	973,449	1,673,337	1,524,103
6	Uzbekistan	1,136,120	983,400	849,000
7	Turkey	816,705	754,600	697,000
8	Australia	386,800	473,497	501,000
9	Turkmenistan	230,000	295,000	210,000
10	Mexico	225,000	195,000	198,000

Source: Statistical data of top cotton producers.

Including cotton in Uzbekistan is an export crop and one of the main strategic resources of the country and the main source of hard currency for the country. Uzbekistan is the sixth largest producer of cotton in the world and the fourth largest exporter of fiber, which is 5 percent of the world production of cotton fiber. Uzbekistan exports about one million tons of cotton fiber per year. In order to preserve the natural quality of the produced fiber it is necessary to comply with certain technical regulations and the conditions of storage, which is the main key.

Experience shows that a significant portion of the cotton produced in the ginning factories, has high humidity. In accordance with the process regulated cotton temporarily stored before being processed mainly at the sites. The fibers and seeds are subjected to additional moisture due to rainfall. Such seeds and fiber, respectively, require a change in processing conditions of storage and processing in oil and fat, and textile mills.

Excessive moisture content and trash cause disturbances in the process of their processing. It should be noted that the measures applied to preserve the natural qualities of technical seeds and fibers and cotton oil mills are ineffective. It is known that the raw cotton is subjected to humid drying DCR ginning factories to processing at its humidity was within 8–9%. However, in most cases, the seeds go high humidity, because the residence time of raw cotton is limited to a drying drum and the seeds are dried because they are not uniform in their structure and are composed of three main components: fiber, peel and seed core. The chemical composition of the components is different and therefore different humidity their

properties. With the change in the humidity of cotton seeds and change its physical and mechanical properties which depend on the process of processing the material and properties of the resulting products [3].

Importance and the physic-mechanical characteristics is considered hardness of peel. During processing under the influence of mechanical stress seed peel is damaged seed, thereby forming a skin with a fiber and broken seed. The degree of damage depends more on the strength of the peel of seeds, which in turn is interconnected with its humidity. Therefore, to determine the influence of these factors on seed quality parameters studied in laboratory species in cotton seeds and S-6524, and Bukhgara-6 and humidity 7–15%. When humidity is 7.8% microhardness of seeds for breeding C-6524 and Bukhara-6 were respectively is 205.8 and 191.7 N/mm<sup>2</sup>. With an increase of seed moisture content to 12% microhardness decreased to 132.5 and 128.2 N/mm<sup>2</sup>. At that time, with the growth, humidity of 12% to 15% microhardness decreased by only 14 N/mm<sup>2</sup>. The weakest section of the seed capable of destruction and the formation of defects is oval part. Therefore, the processing of seeds with moisture content below 7.0% broken seed increases above 9.0% increases skin with fiber. It was assumed that by controlling the temperature conditions can not create favorable conditions that will reduce the extent of the damage and provide a uniform and intensive removal of moisture from the surface of the cotton component. To determine the temperature and moisture on the surface along which heat transfer occurs in contact with other surfaces, contact unsteady equations were used heat-change satisfying conditions and selection of heat absorption of moisture when passing through these surfaces. Assuming that is outer and inner surface temperature as well as humidity and the same, it is possible to write the following equation [4].

$$T_2 = T_{20}(t) = T_k + (T_a - T_k)Q(t), \quad u_2 = u_h - (u_h - u_k)W(t). \quad (1)$$

Moisture on the surface of the skin and core seeds are calculated according to the formulas

$$\begin{aligned} u_{20} = u_2(r, \tau) &= u_h - (u_h - u_k)\bar{W}(\tau), \\ u_0 &= u_h - (u_h - u_k)p_n^{(0)}T_0(\tau), \end{aligned} \quad (2)$$

$T_0$  — Initial values of temperature and moisture-or some components (eg, air) of raw cotton.

$\rho, \rho_1$  — the density of the skin, the air layer and the core

$c, c_1$  — peel and core the heat capacity

$\bar{T}_k, T_a$  and  $\bar{T}_r$  — respectively given skin temperature, air gap and seed kernel

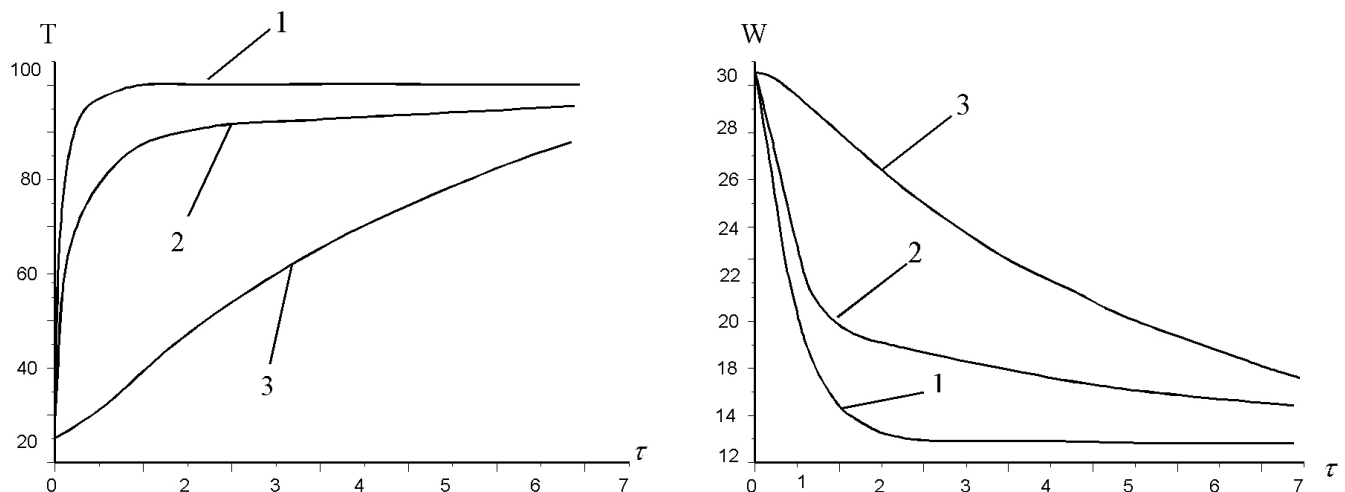


Figure 1. Temperature dependence of (a) and humidity (b) 1 – fibers, 2 – peel, cores 3 times

According to the results of numerical and experimental studies obtained of temperature and humidity of the cotton fiber, peel and seed core of (Fig.1) time. They show that the temperature differential between the fibers and the peel and seed kernel after 30 seconds is 47 °C and 59 °C, a moisture gradient in this case is 1.6% and 9.6%.

These results suggest reviewing the application of the high temperature for drying cotton and difficulties to ensure uniformity deletion of moisture from the cotton component

Further studies have shown that the storage of moist seed is higher than 10% without preventive measures, leading them to self-warming. The intensity of this process depends on the humidity and ambient temperature. Thus, the humidity in the seeds starts self-warming 12–15% on the third day, above 20% — in the second.

When stored cotton seeds with a moisture content of 14.7% of its oil content has changed — the data on the first day I grade 22.4% after 7 days, in 21.6% at 21 days and 18.2% in 35 hours 17.3%.

Increased humidity and weed seed technology led to the creation of favorable conditions for the development of fungus and biological processes, which leads to a qualitative change and reducing their oil content.

To prevent these processes proposed treatment of cotton

seeds in various ways: chemical, thermal, biochemical, electrical, etc. Each of the methods has its own characteristics, advantages and disadvantages. However, given storage cotton seed process is difficult to apply in industry.

One of the main ways to prevent the process of destruction of cotton seeds is heat treatment using heat and mass transfer and hydrodynamic processes. This method can be used in the processing of cotton seeds before storage or an intensification of technological processes of its processing.

Analysis of the known conditions and methods for the preparation of cotton seeds to the processing and storage has shown that it is possible to prevent the self-warming, and change their natural properties.

The basis of the study of self-warming process is settled down not only humidity factor of cotton seeds, but also biochemical and biological processes, which are recorded by changing the speed of germination and seed oil.

**Conclusion:** Based on the above analysis and research to develop and offer new ways of preparing cotton seeds for storage using the heat and mass transfer, hydrodynamic processes are new technologies.

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## Optimization of chamber tunnel typed thermal solar fuel — drying installation with oscillating mode

**Abstract:** A two-chamber convective typed drying installation with two forms of energy supply — electricity and solar radiation are developed. As the test results showed, heat savings in the process of drying the agricultural products based on proposed diagram amounted 27–28%.

**Keywords:** installation, solar radiation, agricultural products, drying, drying medium, chamber, oscillations, heat, convections, optimization.

**Introduction.** Processing of agricultural products requires a certain power expenditures. Drying of the following highly humid and sugar containing products are considered as the most energy-consuming drying process that made from: Grapes, melons, figs, pears, apples, etc. In effort to produce 1 kg of a dried product there should be removed a moisture in amount from 4.2 to 8.5 kg, based on calculation when it is calculated referring to heat this may range from 10,000 to 21,500 kJ. Performance coefficient of many drying assemblies used in the vegetable — drying industry, does not exceed 55% [1, 15–20].

This data shows the acute necessity in improving the energy efficiency of drying assemblies by using of the best achievements of the state-of-the-art technology and processing methods, the possi-

bility of heat recovery exhausted drying medium and optimization of drying modes (conditions).

The modern theory of optimal process control allows you to select several criteria to optimizing drying proceedings, but at the same time it should be noted that the optimization of operating modes of the drying installation for a particular type of product margins its use in drying other types of vegetable raw materials. Therefore, it is necessary the transition from optimization to the efficient and operating conditions, expanding the range and sphere of these drying assemblies.

Increasing the energy efficiency of dryers may be obtained by means of effective using the processed heat transfer having a large enthalpy that conditions the feasibility of its usage as a secondary energy source.



**The research materials.** The close coincidence of graphs of the maximum amount of solar radiation entry ( $680\text{--}1400\text{ W/m}^2$ ) and low relative humidity of the ambient air in the region of Uzbekistan, mass ripening of vegetables and fruits at the timing favored the widespread use of solar energy for drying agricultural products [2, 3–4; 3, 138–142].

The object of the study is solar — fuel dryer installation for drying the agricultural products [4, 163–164] which was developed by our side. Figure 1 shows the design-technological diagram of the dryer.

The installation includes the drying chambers 1, and internally connected by means of V-shaped air distribution duct 2, the main and intermediate electrical calorifier driers 3, a fan 4 with a motor. Between the

chambers mounted on top of the mesh typed roofing strip 5, and four doors 6 are fixed on the loop throughout the chambers butt ends. At the junction point of channels a butterfly valve 7 is installed, and under the chambers a channel section support beams 8 is installed. In each chamber the five multishelved grocery carts 9 are located.

A chambers surface is painted by a composition “black nickel”, having absorptive solar radiation capacity in amount of  $0,89\text{--}0,94$ . Installation is completed with an electric control board.

The dryer installation runs due to heat generated by the primary and intermediate electrical calorifier heaters, as well as at the account of the heat coming to the surface from solar radiation. In night period of a day the dryer runs on the active ventilation.

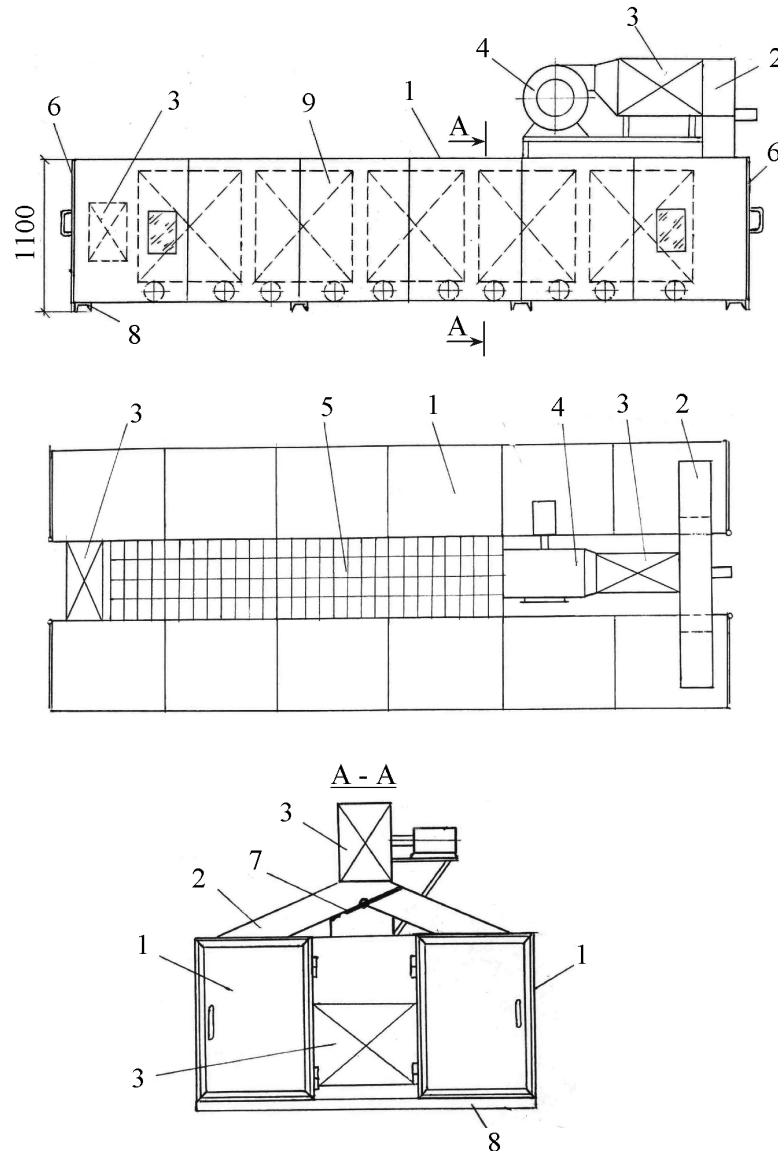


Figure 1. Design-technological diagram of the drying installation

In effort to achieve efficient operation of solar-fuel dryer installation necessary to take into consideration the power regulation modes of the heat source capacity via a thyristor controller. At the same time the running chambers, fan, electrical calorifiers, air-distribution channel constitute a single closed-loop system of the drying medium movement.

The dryer installation runs as in the following: after laying the product on the carts they are pushed into both two chambers by five carriages for each. A fan, then the basic and intermediate electrical calorifier heaters will be turned on.

Heated up to  $82\text{--}85\text{ }^{\circ}\text{C}$  an air flows through one of the air distribution duct hoses into one of the chambers. At the account of heat transfer blow-off there will occur a convective drying process of the product. Due to humidity evaporation to chamber end part the air temperature decreases during the transition to the second chamber it is heated again up to the temperature of  $82\text{--}85\text{ }^{\circ}\text{C}$ . In this case there will blown-off the second batch of carts in the intermediate electrical calorifier heaters flows into the second air distribution channel and the sleeve is removed off outside under the latticed roofing lath, to where pallets are stacked with fresh product. This allows

to use low-potential energy of the effluent temperature carrier for the preliminary saming of fresh product.

In case if oscillating mode of the drying is applied, the timer controls the actuating device, which automatically rotates the damp-er and changes the airflow direction. In sunny weather condition the solar radiation will be directed onto the surface of both chambers, which is due to the heat transfer further on heats the air supplied for the drying proceedings. Such structurally technological binding can save up to 25% of the main source of energy-carrier (current).

**Theoretical discussions and analysis.** Let's consider conformity with a pattern the thermal efficiency of the drying installation consisting only of the solar collector (drawn surfaces of chambers).

Thermal power supplied to the drying chamber, defined by a term [5, 20–22].

$$Q_{dfrs} = \eta_{hr} \left[ \eta_{sas} q_{dfr} - k_{hl} (\bar{t}_f - \bar{t}_o) \right] F_{fr}, \quad (1)$$

where  $\eta_{hr}$  — coefficient of the solar collector heat receiver;  $\eta_{sas}$  — coefficient of the solar radiation adsorption throughout the chambers surface;  $q_{dfr}$  — stream density of the radiation falling onto the chambers frontal surface;  $k_{hl}$  — coefficient of the total heat losses of collector, which is converted to the rays absorbing unit of area;  $\bar{t}_f$  — an average heat transfer temperature throughout the length of chambers;  $\bar{t}_o$  — an average temperature at the heat diverting channel;  $F_{fr}$  - an area of frontal rays absorbing surfaces of chambers камер.

On the other hand, this thermal power is equal to:

$$Q_{dfrs} = G_a c_a (t_1 - t_o), \quad (2)$$

where  $G_a$  and  $c_a$  — appropriately the rate and specific heat capacity of the drying medium (an air);  $t_1$  — an air temperature heated at the account of the solar radiation;  $t_o$  — an temperature environment air.

In its turn, the thermal power generated in the solar collector is consumed in order to evaporate a moisture from the product being dried at the installation  $Q_{pme}$  and for the heat losses compensation through the chamber wall  $Q_{hl}$  and is carried away by the treated drying mediums  $Q_{da}$ , i. e.

$$Q_{dfrs} = Q_{pme} + Q_{hl} + Q_{da}. \quad (3)$$

The values are determined by the terms of the respective terms:

$$Q_{pme} = G_m r, \quad (4)$$

$$Q_{hl} = \sum k_i F_i (\bar{t}_k - \bar{t}_o), \quad (5)$$

$$Q_{da} = G_a c_a (t_2 - t_o), \quad (6)$$

where  $G_m$  — intensity of the moisture being evaporated from the product;  $r$  — latent heat of vaporization;  $k_i$  and  $F_i$  — accordingly coefficient of het losses and heat transfer surface  $i$  — of that chamber wall;  $\bar{t}_k$  — an average temperature throughout the chamber of;  $t_2$  — a temperature of treated drying medium.

For the solar type drying installations being considered the increasing an air temperature from  $t_o$  to  $t_1$  at the drying chamber and decreasing a temperature at the drying chamber from  $t_1$  to  $t_2$  is typical towards the azimuth. Due to this an average temperature value of the drying medium  $\bar{t}_f$  shown in formula (1) and  $\bar{t}_k$  shown in formula (5) are determined as in the following ratio:

$$\bar{t}_f = \frac{t_1 - t_o}{\ln t_1 / t_o} \quad (7)$$

and

$$\bar{t}_k = \frac{t_1 - t_2}{\ln t_1 / t_2}. \quad (8)$$

The values of thermal efficiency of the solar collector  $\eta_s$  and drying chamber  $\eta_{ch}$  are determined from the well-known relationship

$$\eta_s = Q_{dfrs} : Q_{dfr} \quad (9)$$

and

$$\eta_{ch} = Q_{pme} : Q_{dfrs}, \quad (10)$$

where  $Q_{dfr}$  — total stream of falling radiation onto the surface area of frontal chamber

$$Q_{dfr} = q_{dfr} F_{fr}. \quad (11)$$

After that  $Q_{pme}$  is determined from (3) and inserting the obtained value in (10), we will get the following:

$$\eta_k = 1 - \frac{Q_{hl} - Q_{da}}{Q_{dfrs}}. \quad (12)$$

The total thermal efficiency of the drying installation is determined, as the product (9) and (10), e. g.

$$\eta = \eta_s \cdot \eta_{ch} = Q_{pme} : Q_{dfr}. \quad (13)$$

By inserting the value  $\eta_s$  and  $\eta_{ch}$  accordingly from (9) and (10) in (13) and by considering the values  $Q_{dfrs}$ ,  $Q_{pme}$  and  $Q_{dfr}$  from (2), (1), (4), (5) and (6) as well as  $\bar{t}_f$  and  $\bar{t}_k$  from (7) and (8) after appropriate mathematic conversions we will get the following:

$$\eta = \eta_{hl} \left[ \eta_{sas} - \frac{k_{thl}}{q_{mod}} \left( \frac{t_1 - t_o}{\ln \frac{t_1}{t_o}} - t_o \right) \right] \times \left[ 1 - \frac{t_2 - t_o}{t_1 - t_o} - \frac{\sum k_i F_i \left( \frac{t_1 - t_2}{\ln \frac{t_1}{t_2}} - t_o \right)}{\eta_{hl} \cdot q_{dfr} \cdot F_{fr} \left[ \eta_{sas} - \frac{k_{thl}}{q_{dfr}} \left( \frac{t_1 - t_o}{\ln \frac{t_1}{t_o}} - t_o \right) \right]} \right]. \quad (14)$$

**Practical results.** On the fig.2 there are specified curve dependencies of the thermal efficiency of a drying installation ( $\eta$ ) from the warming-up temperature of marked-up surface of the chamber ( $t_1$ ) and at outlet of the dryer chamber ( $t_2$ ), structured on the basis of solutions (14) in the event if  $\eta_{hl} = 0,85$ ;  $\eta_{sas} = 0,70$ ;  $k = 7,0 \text{ W}/(\text{m}^2 \cdot \text{C})$ ;  $q_{dfr} = 700 \text{ W}/\text{m}^2$ ;  $\sum k_i \cdot F_i / F_{fr} = 1,0$  and  $t_o = 35 \text{ }^\circ\text{C}$ , which in initial approach are closer to the practical operational characteristics of convective type solar fuel installations.

As it is required from the graphs shown in the fig.2 in case of remaining equal conditions the increase of treated drying medium temperature ( $t_2$ ) will lead to reducing the thermal efficiency of dryer installation. As at the event when  $t_1 = 80^\circ\text{C}$  is increased  $t_2$  from  $35^\circ\text{C}$  (in the period of ensuring constant velocity of the drying process) to  $50^\circ\text{C}$  at the final stage of drying process will lead to decreasing  $\eta$  from 0,38 to 0,23, e. g. for 39,5%.

It also from the graphs should be followed that dependence  $\eta = f(t)$  is almost linear only at  $t_2 = 35^\circ\text{C}$ . In case if  $t_2 = 45^\circ\text{C}$  when the value of  $t_1 = 70^\circ\text{C}$  is increased the firstly  $\eta$  value increases up to

0,29, and then decreases. In case if  $t_2 = 50^\circ\text{C}$ , the maximum efficiency capability value  $\eta$  is related to  $t_1 = 80^\circ\text{C}$  and corresponds to 0,24.

Thus, based on the solution (14) and the graphical dependencies  $\eta = f(t_1, t_2)$  it is expected as possible to optimize the tempera-

ture of the effluent drying medium. Power-saving mode of the dryer installation operation is also possible by applying reclaimed packed heat accumulators.

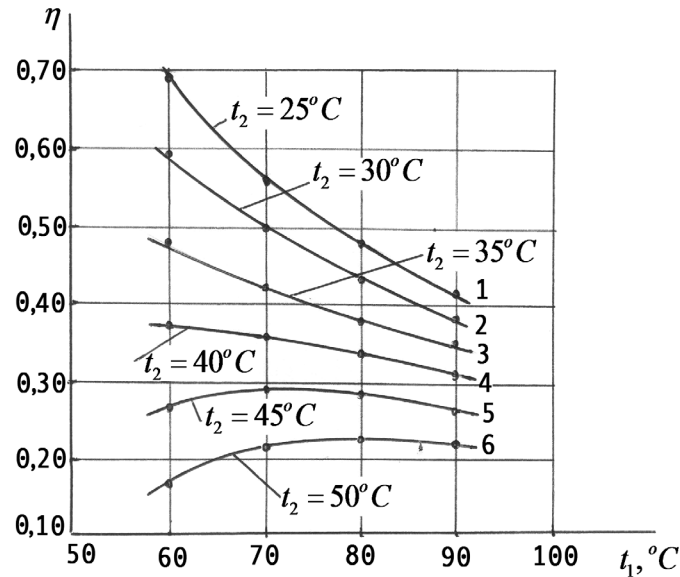


Figure 2. Dependency of the drying installation efficiency from the chamber surface warming-up temperature ( $t_1$ ) and at the drying chamber outlet ( $t_2$ )

In the second period of drying process when the temperature of the drying medium at chambers' outlet becomes above the wet bulb thermometer temperature ( $t_h$ ) such as 8–10 °C or more, the drying medium is passed through the quarry packed heat accumulator, its heat will be supplied to the packing part and is discharged into the atmosphere. At night the air being intake, passes through the quarry packing part and is heated-up at the expense of accumulated energy.

Temperature controller reduces the capacity of the main heat source at “on — off” mode and thus energy-saving mode will be ensured.

Dimensions, the thermal and aerodynamic characteristics of regenerative packed-type accumulators are determined depending on

the performance capabilities of the dryer installation by considering the thermophysical properties of the packing material, its porosity and overall dimensions of the packing elements. As the test results showed, saving the heat in the process of drying the agricultural products on the proposed diagram shall amount 27–28%.

#### Conclusions:

- design-technological diagram of the dryer installation by rays absorbing surface areas of chambers is proposed;
- influence of the effluent drying medium temperature on the performance coefficient (PC) of the thermal efficiency of the convection dryer installation;
- an analytical dependence for determining the performance coefficient of the solar-type fuel drying installation is concluded.

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## Geometric characteristics and change bulk form part of the product impregnated with the polymer composition based on collagen

**Abstract:** In the article the results of research conducted geometric characteristics and changes in the form of bulk pieces of garments made of natural fur, treated with a polymer composition based on collagen.

**Keywords:** deformation, forming, is fastening forms of physical and mechanical properties, dimensional stability, and the package of clothing details.

Among the production of light industry products occupy a significant place garments leather and fur. Improving the production of garments technology associated with the tasks aimed at expanding the product portfolio, improving its quality, rational use of the main and auxiliary materials, as well as reducing the share of manual labor in the industry. Results of the solution of this problem should be reflected in the preparation of high quality apparel products, the production of which is not accompanied by an increase in the complexity of its manufacturing process [1–3].

One of the indicators of quality of products is the preservation of an attached volume form. To study the dimensional stability against external force and a component of the mechanism deformation (shape change) may be sufficient to examine the physico-mechanical and technological properties of the package with

the polymer composition. To carry out experimental research in this paper method was used, proposed in [4].

For bulk samples of fur from a polymer composition selected by the following factors: the radius of the spherical segment — R; the height of the spherical segment — H; Load direction on the deformation — R.

Included factors for the bulk samples with fur polymer composition were coded as follows:  $X_1$  — radius of the spherical segment m;  $X_2$  — the height of the spherical segment, m;  $X_3$  — load aimed at deformation N. The values of incoming factors are given in table. 1.  $X_3$  — load aimed at deformation was adopted in a number of outside factors on the basis of scientific research. As a result of research experiments, it was found that the load is aimed at the deformation is of great importance when selecting the geometric dimensions of bulk samples of fur with the polymer composition [5].

Table 1. – The value of incoming factors

Title factor	coding sign	The real value of the factor			The gap changes
		-1	0	+1	
The radius of the spherical segment, m	$X_1$	0,75	0,78	0,81	0,03
The height of this spherical segment, m	$X_2$	0,50	0,52	0,54	0,02
Load aimed at deformation, N	$X_3$	0,65	0,70	0,75	0,05

Factor  $X_2$  – is the height of the spherical segment, where the lower value of the geometric dimensions of selected bulk samples in the range of 0.50 m, and the highest value is 0.54 m.

Overlooking factor, ie the experimental results and the dispersion of cleaning efficiency are given in table 2.

Table 2. – Experimental results and dispersion exiting factor

№	$X_1$	$X_2$	$X_3$	$y_1$	$y_2$	$y_3$	$\bar{y}$	$S^2\{Y\}$
1	–	–	–	79,4	79,9	80,2	79,8	0,165
2	+	–	–	77	77,5	76,25	76,9	0,39625
3	–	+	–	78,3	77,1	77,5	77,6	0,75
4	+	+	–	76,5	77	76,7	76,7	0,13
5	–	–	+	84,4	83,9	84,1	84,13	0,06335
6	+	–	+	83,4	82,9	83,6	83,3	0,26
7	–	+	+	77,8	78,2	77,4	77,8	0,16
8	+	+	+	85,4	85	84,9	85,1	0,07
Итого							641,33	1,9946

Now we form the regression equation and calculate the regression coefficients.

The regression equation

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_{12}x_1x_2 + b_{13}x_1x_3 + b_{23}x_2x_3 + b_{123}x_1x_2x_3$$

After performing calculations preobraetaet regression equation as follows

$$Y = 80,16 + 2,82x_1 + 1,25x_2 + 2,02x_3 - 0,67x_1x_2 + 0,4x_1x_3 - 0,27x_2x_3 - 1,66x_1x_2x_3$$

With the help of the payment value of the Student test verified the significance of the regression coefficient.

For certain regression coefficients calculated the estimated value of the Student test.

Based on the calculations revealed that values more than their tabulated values and are therefore considered relevant and will be used in further calculations. So as a result of calculations it was found

that the coefficients  $b_0, b_1, b_2, b_3, b_{12}, b_{13}, b_{23}$  and  $b_{123}$  are considered to be significant, and further calculations were carried out based on these factors. This regression equation is as follows

$$Y = 61,4 + 2,79x_1 + 1,116x_2 + 1,8x_3 - 0,7x_1x_2 + 0,43x_1x_3 - 0,14x_2x_3 - 1,61x_1x_2x_3$$

The resulting regression equation was tested for adequacy by using Fisher's exact test are given in table 3.

Table 3. – Values of emerging factors obtained by calculating the regression equation

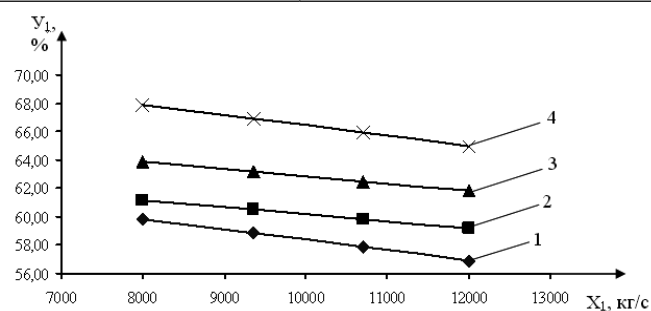
№	$\bar{Y}_i$	$Y_{Ri}$	$\bar{Y}_i - Y_{Ri}$	$(\bar{Y}_i - Y_{Ri})^2$
1	84,8	82,1	2,7	7,29
2	76,9	75,64	1,26	1,588
3	77,6	76,642	0,958	0,918
4	76,7	75,418	1,282	1,644
5	84,13	82,942	1,188	1,411
6	83,6	81,99	1,61	2,59
7	87,4	86,638	0,762	0,581
8	84,9	83,75	1,15	1,323
in total				17,345

The regression coefficients derived from the regression equation are important in characterizing emerging factors. Where, for large values of the regression coefficient before entering factors will greatly influence the factor of leaving this factor. Conversely, if a lower value of the coefficient of influence will also be minimal. Signs before factors indicate their influence. Where in sign (+) indicates a positive effect on exiting factor, while (-) negative effect on the contrary.

The figure shows a segment of the radius of the relationship with the stability of the form. The first line on the graph represents the minimum value of  $x_2$  and  $x_3$ , and the second line of graded intermediate values, and the fourth line of the maximum values.

Analysis of experimental studies have shown, with an increase from 0.75 to 0.81, ie at the minimum values of  $x_2$  and  $x_3$   $x_2 = 0.50$  m,  $0.65 \times 3 = H$  from 84.1% to 77.68%, the maximum  $x_2 = x_3 = 0.54$  m and  $0.75 H$  from 88.78% to 85.79%, with intermediate values from 81.18% to 79.16%, from 83.86% to 81.83%, a decrease shape stability.

When the height of the segment increased from 0.50 m to 0.54 m, with the minimum values of the effectiveness of cleaning  $x_1$  and  $x_3$ , that is, when  $x_1 = 0.75$  m and  $0.65 N$  will be from 79.77% to 77.61% at  $x_1$  and  $x_3 = 0.77 = 0.73 H$  from 80.50% to 80.51 at  $0,78m \ x_1 = x_3 = 0.70 H$  from 81.64% to 82.95, when  $x_1 = 0,81m$  and  $x_3 = 0.75 H$  from 83.23% to 84.99 visible changes.



where, 1 -  $X_2 = 0,50$  m,  $X_3 = 6,5 H$ ; 2 -  $X_2 = 0,52$  m,  $X_3 = 0,70 H$ ; 3 -  $X_2 = 0,52$  m,  $X_3 = 0,72 H$ ; 4 -  $X_2 = 0,54$  m,  $X_3 = 0,75 H$

Figure. Schedule communication form stability and segment radius

In this segment by increasing the radius of the following changes are observed from 6.5 N to 7.5 N at  $x_1 = 0.75$  m and  $x_2 = 0.50$  m from 79.77% to 84.18%, with  $x_1 = 0.77$  m and  $x_2 = 0.51$  m from 78.30% to 84.99% with  $0.78 \ x_1 = m$  and  $x_2 = 0.52$  m from 77.27% to 85.15% and  $x_1 = 0.81 \ x_2 = m$  and  $0.54$  m from 76.66% to 84.99%.

Analysis of the above graphic relationships resulting regression equations analytical solutions based on experiments conducted polnofactoryh allows you to choose the rational conditions of formation of the package and the geometric parameters of the product to obtain a product with high resistance obemnyh samples of fur from the polymer composition.

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## About designing the working clothes based on the anthropological characteristics of man's body

**Abstract:** The article is dedicated to determination of the problem of designing working clothes for the workers of different specialties and there are analyzed the results of anthropomorphic research of the peculiarities of 400 respondents from Tashkent city and Tashkent region by 30 features and had been formed the table about distribution of the size rates. Depending on aim of choosing and recommendation of the rational version of the construction in consideration of functional-ergonomically demands in designing working clothes for the workers of several specialties was determined object for analyzing methods.

**Keywords:** designing, figure, size-height, construction, working clothes, respondent, anthropomorphic research.

**Introduction.** The working cloth is one of the mean of men's protecting, it's destination is to protect him from different kind of harmful factors at the manufacture and forms special complex of demands for the working clothes. In terms of these it should support labor protection; save from harmful factors at the manufacture; maintain normal functional condition and working ability of the worker during producing process; it doesn't irritate human's organism at the exploitation process.

The working cloth should be chosen in terms of determined worker's height and sizes and could respond to specific features and terms of the work and support labor protection at the working place.

Actuality of designing the working clothes is depend on determination "the address" of the product that been manufactured and respond to terms of workers' working cloth. It requires to design the working clothes depending on determined typological group terms of the population and realizing it in condition of mass production, that supposing individualizing processes to take into consideration individual consumers' figure specifics.

Mass production of the workers' working clothes in accordance with figure would support workers safe working conditions, effective using of the operating time and comfort of actions. In designing of the working clothes it should be recognized the workers' figure poses and action at the working process to support it's comfortable using and knowledge of the figure's dimensional features. The size dimensional indications determined by several dimensions. When suitable dimensions for man's figure and information about different population groups' dimensions will be known than can be produced suitable wear in accordance with man's figure shape and dimensions [1].

**Problems of Designing the working clothes in consideration of the figure's anthropometric dimensions.** The working cloth should satisfy a complex difficult requirements as protective, hygienic, operational, and aesthetic. Therefore during the operational time man should keeping normal functional state and working ability. That's why the problem of designing the working cloth based on anthropometric dimensions in consideration of the man's figure is one of the actual problems.

Development of the dimensional typology at cloth production process begins with appropriate dimensional indicators that would be used in designing process. In this process is important

to take place determine person's age, nationality, profession and dimension.

In research work the object cannot be observed fully; if in all population mass the defined typology man's will appear with identical frequency it will be effective to choose specimen from object. In order that average error doesn't more than 5% the volume of the mans selection shouldn't be more than 400 [2].

In accordance with premise the anthropometric research work had been done among Tashkent city and Tashkent region's food and auto transport industries' workers. In this process take part average age group from 400 man in age about from 30 to 40. Among them the men about 30–33 age are 35%, 34–36 age are 37%, and 37–40 are 28%.

The dimension program of the cloth designing consists of from 60 to 70 dimensions. For the research work 30 dimensions have been chosen that used in projecting men's outer wear [3]. The anthropometric researches held on dimensions like circles, lengths, heights, widths and distances [4]. The monitoring of finding results have been done by the dimension program. For solvation of the indicators problem that determined with program as height, breast circle and waist circle dimensions were contributed and that dimensions have been analyzed based on 400 respondents' anthropometric dimensions. The obtained results showed in diagrams (Fig. 1,2,3). In accordance with accepted six height dimensions for the men's figure the height dimensions have been sorted by suitable intervals.

In diagram showed that 36% of workers'and employees' are part of the men's group with 174–179 height. The lowest height between 156–161 sm is 2%. The men with highest heights about 186–188 is 3%.

The results of researches show that 30% of workers'and employees' the men with breast circle dimension about 100 sm and 25% — men with breast circle dimension is about 96 sm, 1% have the smallest breast circle dimension is about 80 sm, and 3% have the biggest breast circle dimension is about 108 sm.

The waist circle of the men's figure supports good fitting. Many results of measuring shows that besides the breast circle dimension changings the waist circle with abdomen convexity dimension is changing in several rates. The waist circle with abdomen convexity dimension shows changings on the population figure and these dimensions are really important in cloth designing.

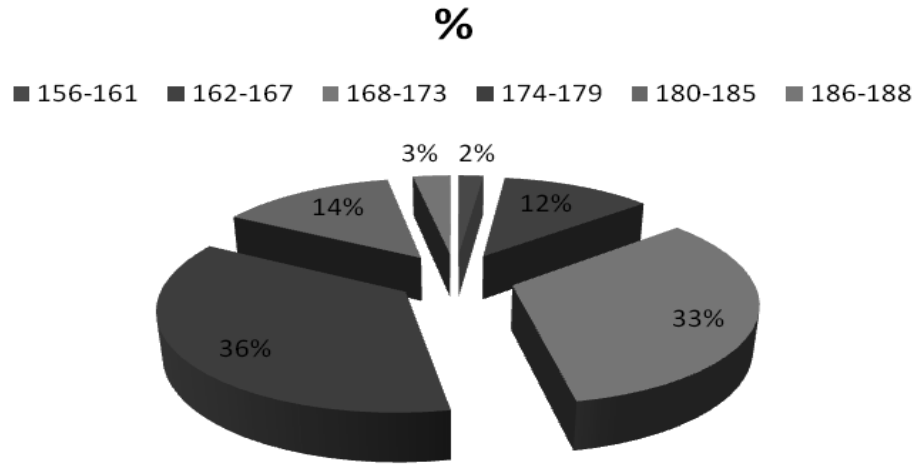


Figure 1. Men's height dimension analyzing

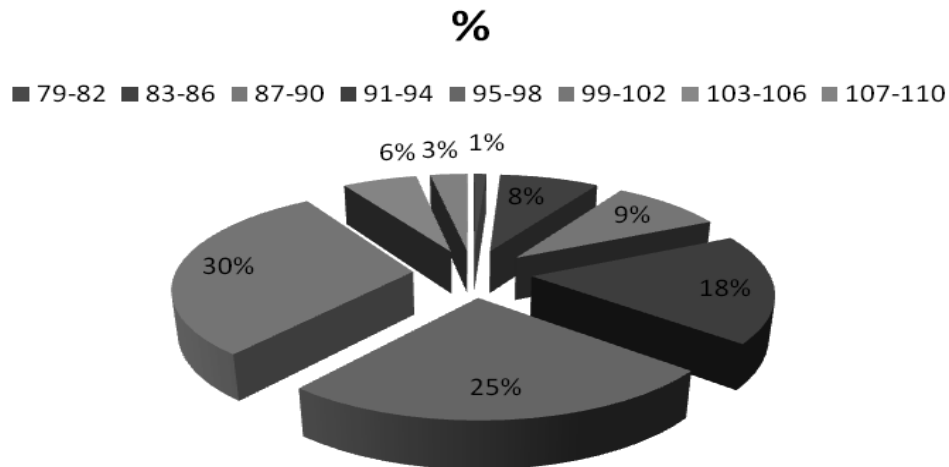


Figure 2. Men's breast circle dimension analyzing

Analyzing the waist circle dimension of the respondents shows that 24% of men have the indicators about 82 sm, 8,75% -78 and 86 sm, 11,25%-90 sm, 10,75% — 94 sm, 5,25% -74 sm, 4%-98 sm, 3,25% — 102 sm, 1,5% — 72 and 106 sm, 0,75% -110 sm, 0,25% -66 sm.

It is known that the waist circle's value determines the certain fullness group of men's typical figure. Whereas the respondents' figures fullness groups have been analyzed. The results of analyze showed on pic.4.

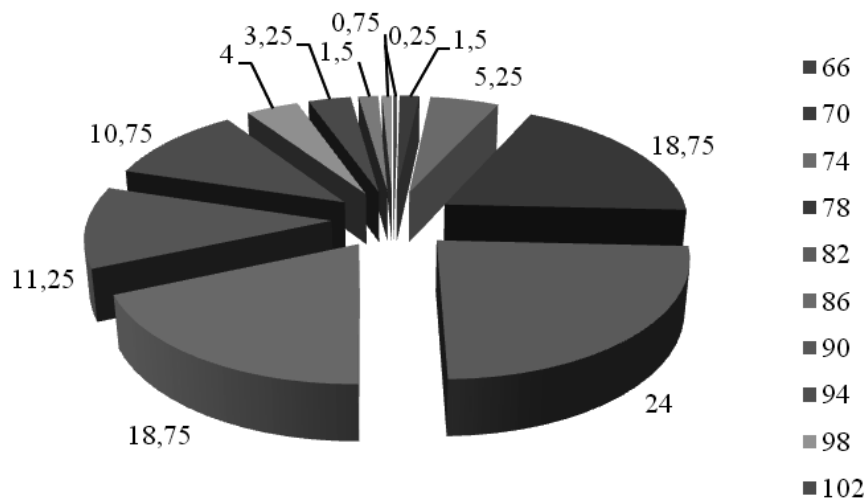


Figure 3. Men's waist circle dimension analyzing

The obtained results shows that between 400 respondents there are 7,5% of I group fullness, 27% of II group fullness, 32,5% of III group fullness, 26,75% of IV group fullness and 6,25% of V group fullness. The results of consideration dimensional indicators'

fullness amount determine that these indicators are difference in 80-96 dimension group is less than in 100-108 dimension group. Thus shows that the growth of figure dimensions don't effort to the growth of the fullness group dimensions.

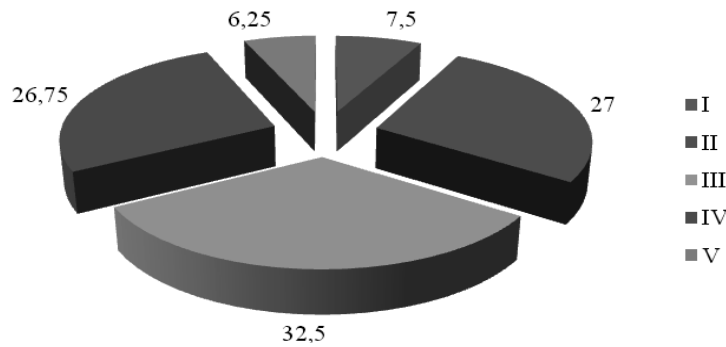


Figure 4. Men's figure fullness group distribution

In accordance with men's figure dimension values have been composed size and height values distribution (table 1), and in table showed the percentage of accordance between dimension and heights, however, the main aim is determining the frequency of size and heights of men's about age from 30 to 40.

The research works that realized among respondents show that 92–96–100 size have the most occurrence at III and IV fullness group. The results of the dimension and height values distribution

show that 100 size at III height is 10, 25%, 96 size at III height is 8,25% and at IV height is 8,75%, and 92 size at III height is 8,0%.

In consideration of premise the working clothes for the construction, food and auto transport industries' workers and employees should be designed for III and IV heights and 92–96–100 sizes. In projecting men's working cloth the mass production of III and IV heights and 92–96–100 sizes should depend on typical figures only.

Table-1. – The distribution of dimension values in accordance with anthropometric research results

Size, sm	80				84						
Height, sm	III	IV	I	II	III	IV	V				
Recommended dimension and height percent,%	0.75	1.25	0.75	1.25	3	2.5	1.25				
Size, sm	88				92						
Height, sm	II	III	IV	V	II	III	IV	V	VI		
Recommended dimension and height percent,%	0.75	2	5	1.75	2	8	7.5	2.25	0.25		
Size, sm	96					100					
Height, sm	II	III	IV	V	VI	I	II	III	IV	V	VI
Recommended dimension and height percent,%	3	8.25	8.75	3.25	1.25	0.5	3	10.25	7	5.25	2
Size, sm	104					108					
Height, sm	II	III	IV	V	VI	II	III	IV	V		
Recommended dimension and height percent,%	0.5	1.25	1.25	0.25	0.75	0.5	1.25	1	0.5		

In consideration of anthropometric dimensions in designing the working cloth for construction, food and auto transport industries should be solved following problems:

1) Duration, intensity and recurrent of the dangerous and harmful influence factors;

2) The main figure poses and actions during execution of the technological operations by worker. The observation of the specific figure poses helps to choose constructive addition and form of the working cloth [5].

The researches' results shows that in projecting the working cloth should be recognized the following requirements:

- Correspondence to weather conditions and season of the working cloth exploitation (summer, winter and all-season);
- Strength and durability of the working cloth textile;
- The working cloth should serve several years;
- Strength of the cloth's seam and stitches and durability to the outward factors;
- Comfort in day-to-day wear and ergonomically fitting, fitting the professional features (there are the cloth cut, pockets size, number and placement, fastener construction);
- The construction of the working cloth should support comfort in a process of the worker's different poses and actions;

- Cloth Reliability, it's shape, laundering and shrinkage stability;
- Hygiene accordance: the working cloth should protect from cold, and let in moisture and air.

In designing the working clothes for the industries workers and employees in consideration with man's functional-ergonomically requirements should be realized of the choosing the analyzing methods of construction's rational varieties.

It's necessary to underwrite that depend on operation condition supporting the cloth construction parametrical and dynamical accordance is one of the main factors in designing the working clothes for all spheres' workers.

**Conclusion**

1. The research results analyze of the men's typical figure structure and dimensional indicators among 400 respondents of the men age from 30 to 40 at Tashkent city and Tashkent region show that height, breast circle and waist circle's dimensional values for designing the working cloth have been analyzed and have been studied men's typical figure fitting fullness group.

2. Under anthropometric research results the dimensional values distribution have been realized and recommend to design men's working cloth for III and IV heights and 92–96–100 sizes.



3. Designing the working clothes for the construction, food and auto transport industries workers and employees in consideration with man's functional-ergonomically requirements should be

realized of the choosing the analyzing methods of construction's rational varieties.

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## Substantiation of parameters of equalizing-compacting operating element of the combined machine

**Abstract:** the results of substantiating the parameters of the equalizing-compacting operating element of the combined machine for the pre-sowing soil tillage are specified in the article.

**Keywords:** the combined machine, the equalizing-compacting operating element, equalizing part, compacting part, setting angle of compacting part, bending angle of part to be levelled, height of operating element.

We have developed combined machine for soil tillage operations before sowing the agricultural seeds and the research activities on substantiating the reasonable values of the parameters of its operating element have been implemented.

The combined machine consists of allocated on the framework consequently equalizing-compacting operating element and slat roller. At one time pass it ensures equalizing the field surfaces, compacting and crashing the top layers of soil.

Equalizing-compacting operating element (further on operating element) is constructed of two parts: equalizing 1 and compacting 2 (figure 1). It is installed to the framework by means of bars.

The main parameters of operating element are:  $\gamma$  — installation angle to compacting part horizon;  $\varepsilon$  — bending angle of equalizing part relatively compacting part;  $H$  — height.

Installation angle to compacting part horizon of the operating element were determined in terms in a purpose to ensure its equal time interrelation with soil particles were minimal as in this case, firstly, due to sticking the soil to its working surface, secondly the reliable performance of technologic process implementation at minimal energy costs.

Taking a chance to use a diagram on the fig. 2, a let's determine an interrelation time of the operating element compacting part with soil particles

$$t = \frac{h_0}{V_c \sin \gamma} = \frac{h_0}{V_M (\cos \gamma - \sin \gamma \operatorname{tg} \phi) \sin \gamma}, \quad (1)$$

where  $h_0$  — submergence depth of the operating element compacting part into a soil;  $V_c$  — soil particle sliding velocity throughout the working surface of the operating element compacting part;  $V_M$  — onward velocity of machine;  $\phi$  — external friction angle of soil.

Let's research the formula (1) base on  $\varepsilon$  for extremum [1] and we will get the following:

$$\gamma = \frac{\pi}{4} - \frac{\phi}{2}. \quad (2)$$

In a purpose to determine the bending angle of equalizing part of the operating element relatively its compacting part let's review forces influencing from its side to the soil particles (fig.2, b). In the process when machine is running from the equalizing part of operating element a normal force  $N$  and friction force  $F = N \operatorname{tg} \phi$  influence onto the soil particle.

Let's put  $N$  normal force, influencing onto the soil particle over the containing  $N_v$  and  $N_r$ , acting accordingly towards the operating element (machine) and alongside with its equalizing part.

$$N_v = N / \sin(\gamma + \varepsilon) \quad (3)$$

and

$$N_r = N \operatorname{ctg}(\gamma + \varepsilon). \quad (4)$$

Obviously, that in effort to ensure the qualitative equalizing the soil surface the following term must be performed:

$$N_r < F, \quad (5)$$

as in otherwise the soil particles are pressed into its deepside without any sufficient longitude motion and at result the required quality on soil surface equalizing will not be ensured.

Taking into account (2) and (4), as well as above mentioned value  $F$ , we will get the following:

$$\varepsilon > 90^\circ - (\gamma + \phi). \quad (6)$$

height  $H$  of the operating element was determined due to exclusion term of sprinkling the soil through its topside edge. In this case we will have the following formula:

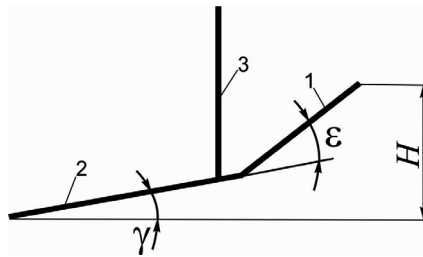


Figure 1. Scheme and parameters of compacting-equalizing operating element of the combined machine

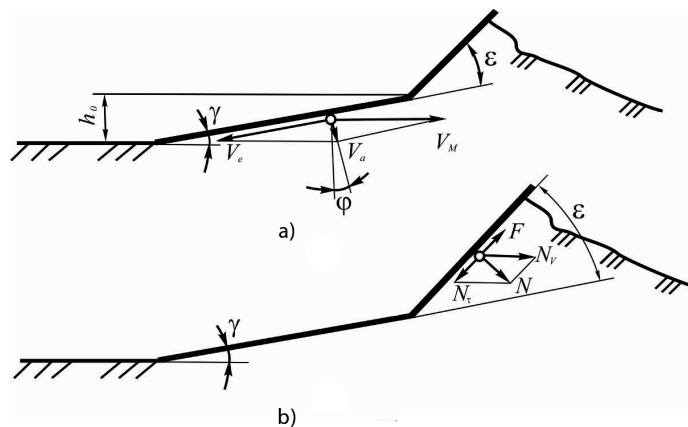


Figure 2. Scheme for determining the installation angle of compacting part (a) and bending angle of equalizing part (b) of equalizing-compacting operating element of the combined machine

$$H \geq \sqrt{\frac{4Z_n l_n}{\pi [ctg \mu - ctg(\beta - \varepsilon)]}}, \quad (7)$$

where  $Z_n, l_n$  — average height and length longitudinal unevenness of the field surface;  $\mu$  — soil slope of the drawing prism, formed ahead of the equalizing part of operating element.

Calculations implemented base on the formulas (2), (6) and (7) in terms of  $\phi = 30^\circ$ ,  $\mu = 30^\circ$ ,  $Z_n = 0,05$  m and  $l_n = 0,40$  m

[2], show that the installation angle to horizon of the operating element must be  $30^\circ$ ; bending angle of its equalizing part relatively compacting part — at least  $30^\circ$ ; height of equalizing device — at least 16 cm.

**Conclusions:** Thus in effort to ensure the required quality of soil tillage at minimum energy (power) costs the installation angle to compacting part of the equalizing-compacting operating element must be  $30^\circ$ , bending angle of its equalizing part — at least  $30^\circ$ , height of equalizing device — at least 16 cm.

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## Substantiation of parameters of knife spade of the seeder

**Abstract:** the design of a seeder with knife-type opener (spade) type of a basic runner for autumnal wheat crops in cotton row-spacing is offered. Raises efficiency of technology of cultivation in comparison with traditional the maximum use of a profile of a furrow.

**Keywords:** requirements, spade, crops, seeder, cultivation, technology, efficiency, knife-type opener, seed funnel, crumple, form of a wedge.

The analyses of researches directed on creation spade for crops of grain crops in row-spacing of cotton have shown about necessity of preliminary studying of a profile of surfaces. Processing of experimental data have shown that depth of a furrow in row-spacing fluctuates from 12,5 to 17,0 sm. This data has allowed choosing the form and parameters of spade (fig. 1).

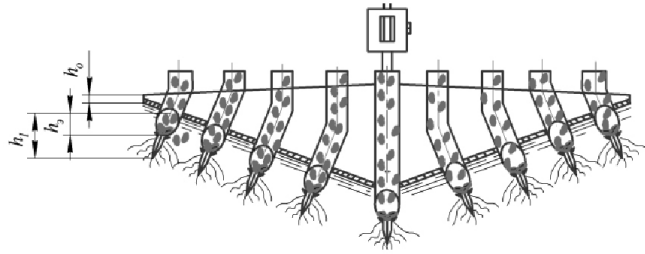


Figure 1. The scheme of spade and a cross-section of a row-spacing of cotton

Technological process of crops proceeds as follows: At movement spade the left and right wings should lean, and slides on a row-spacing profile, copying roughness after preceding processing. Flat knives are similar to a wedge form in groove soil where the seeds submitted a seed funnel keep within. Uniformity and depth of seal are thus maintained. Because the bottom edge seed funnel are located above (at height  $h$ ) the bottom edge of knives at seal of seeds, seed funnels are not hammered by the vegetative rests, leaves of cotton and seeds go on till the bottom of a sowing groove without hashing with soil, providing uniform seal on the set identical depth. Thus grooves and a friable zone, from knives are simultaneously formed slightly condensed seed funnel. Wings, nestling from the vertical loading, sections created from weight about a furrow bottom, limit depth of immersing of knife and form slightly condensed bed of a row-spacing. Knives plunging into soil, cut and move apart it at angle edges, create a friable zone, and seed funnels form small grooves with the condensed bottom where seeds which are fallen asleep by wings keep within. Conditions for a capillary rising of moisture to seeds from the bottom layers of earth are thus created. Such scheme of placing of seeds allows using as much as possible planes of a furrow of row-spacing, providing crops directly and in a protective zone of cotton. If to consider cutting wedge as vertically established rectangular plate, the basic requirement to it — maintenance of a pure cut of soil with the minimum moving of particles on vertical and across. It is possible to reach a correct choice of thickness of a knife and an edge angle of slope to horizon (an occurrence corner). At movement of a direct plate in soil the size of lateral deformation is influenced considerably by a corner of occurrence of its cutting edge in soil. Such deformation occurs at a wedge to an occurrence corner in soil ( $\gamma > 90^\circ$ ). In this case soil particles are pressed downwards and squeezed out then in sides by a cut plate of a crack. Thus with increase in a corner of occurrence of plate compressing force increases, cave-in downwards increases, and lateral deformation decreases to the limits caused only in the thickness of a plate [1, 158–160]. Affirms [1, 194–197] that spade with an occurrence obtuse angle it is expedient to apply only at work on the soil littered with the vegetative rests.

The made observations prove to be true results of tests of the experimental sowing car, spent in 2008 in an educational pilot farm of the Tashkent institute of irrigation and melioration (ТИИМ) have been thus tested spade with an input acute angle in soil.

In experiences accumulation weed plant and cotton leaves before spade seeders was observed. It has once again proved about expediency of application of working bodies with an occurrence ob-

tuse angle at autumn wheat crops in cotton row-spacing. The carried out analyses have shown that a question on deformation of soil by a wedge which is of the basic part spade of seeders at crops winter in row-spacing of cotton, till now are studied insufficiently.

Considering are similar to a knife wedge without a runner as bilateral symmetric, it is possible to reduce its influence on soil to crumple soils lateral sides in a horizontal direction. Supervision have shown that as a result of wedge interaction there is a replacement by it from soil of some volume limited to planes of shift, both in a movement direction, and in a cross-section direction to wedge sides.

Clearly to present, influence process spade similar to a knife wedge on soil, we will consider soil deformation under influence similar to a knife wedge with an occurrence obtuse angle.

Formation of a groove in width to 7,5 sm, caused in the narrow-rowed way of crops of autumn wheat in row-spacing, is based on interaction of a wedge with soil. Thus, it is considered that the wedge is established with cutting loud at an obtuse angle occurrence that is  $\gamma > 90^\circ$ .

Researches [2, 65–69] affirm that the corner of a point of a wedge (fig. 2) will differ in this case from its constructive corner of a point, that is

$$tg\tau' = tg\tau \cdot \sin\gamma \quad (1)$$

The formula for definition of a constructive corner of a point is recommended

$$i = \arctg \frac{tg(\frac{\pi}{2} - \phi_c)}{\sin\gamma} \quad (2)$$

At groove formation in row-spacing, the occipital facet of a wedge condenses a layer of earth in size  $0,5\delta$  therefore there is jet force  $R_3$ .

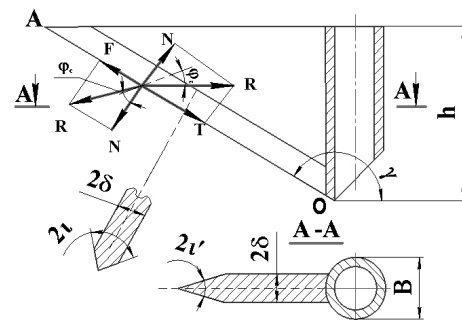


Figure 2. The scheme to definition of the corner of a point of a knife in the form of a wedge

If it is accepted that resistance of soil crumple is proportional to deformation size distribution normal pressure of soil upon an occipital facet of a wedge will have the triangle form. The maximum value  $p$  pressure of soil in points in and with equal

$$\rho = q \cdot \delta \quad (3)$$

Where:  $q$  — proportionality factor (factor volume crumple soils);

$\delta$  — half thickness of a wedge.

Equally effective  $N_3$  elementary normal pressure of soil upon napes of an edge of a two-sided wedge, obviously, it is equal

$$N_3 = \frac{A\bar{B} \cdot \rho b}{2} \quad (4)$$

Where:  $b$  — length of an edge of a two-sided wedge with an occurrence obtuse angle.

Substituting in expression (4) values  $A\bar{B} = \frac{\delta}{\sin\tau}$  and considering expression (3), we receive

$$N_3 = \frac{q \cdot \delta^2 \cdot b}{2 \sin t} \quad (5)$$

As  $b = \frac{h}{\sin \alpha}$  let's receive  $N_3 = \frac{q \cdot \delta^2 \cdot h}{2 \sin t \cdot \sin \alpha}$  (6)

Force  $R_3$  forms with equally effective  $N_3$  a friction corner  $\phi_c$ , therefore its size can be defined according to dependence

$$R_3 = \frac{q \cdot \delta^2 \cdot h}{2 \sin t \cdot \sin \alpha \cdot \cos \phi_c} \quad (7)$$

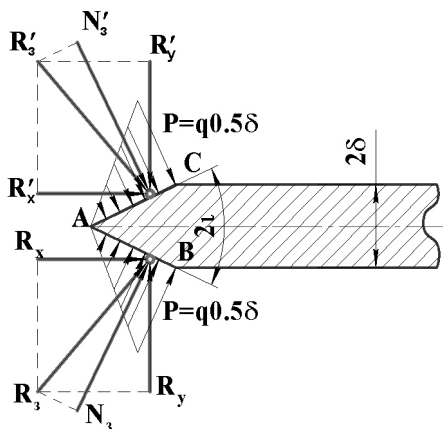


Figure 3. The scheme to definition of pressure of soil on a nape of a knife in the form of a wedge

The lateral component of this force is equal

$$R_{3y} = q \cdot \delta^2 h \frac{\cos(t + \phi_c)}{2 \sin t \cdot \sin \alpha \cdot \cos \phi_c} \quad (8)$$

Or  $R_{3y} = 0,5 \cdot q \cdot \delta^2 h \cdot \sin \alpha \cdot (ctgt - tg\phi_c)$  (9)

The horizontal component of this force is equal

$$R_{3x} = 0,5 \cdot q \cdot \delta^2 h \cdot \sin \alpha \cdot (tg\phi_c \cdot ctgt + 1) \quad (10)$$

From the expression (8) follows that on size of force  $R_{3x}$ , aspir-ing it is pushed out soils an occipital facet of a wedge, the great-est influence is rendered by thickness of an occipital facet of a wedge.

Analyses showed [3, 328–330] that the greatest widths of an occipital facet, admissible at work of ploughs at soil plough were in limits 6 ... 11 mm.

Being based on this data, it is possible to define a limiting thick-ness of a wedge  $2\delta$

$$\delta = e \cdot \sin t \quad (11)$$

Where:  $e$  — length of a facet, mm.

Slope,  $e = 8\text{mm}$ ,  $t = 22,5^\circ$  we have  $\delta_1 = 8 \cdot \sin 22,5^\circ = 3,06\text{mm}$ .

Being based on these calculations it is possible to believe that stability of a course is similar a knife wedge is provided, if its thick-ness  $2\delta$  is in limits of 6,12 mm.

Then  $\sin t = \frac{\delta}{e} = \frac{3,06}{8} = 0,3825$

$$t = \arcsin 0,3825 = 22,5^\circ \quad (12)$$

It is considered [3, 324–326] that the corner  $\gamma$  should be such that at knife movement cutting with sliding along cutting edges was carried out AO (fig. 2).

That the soil did not gather in a heap, it is necessary to meet condition  $T > F$ , after statement of value of forces leads to a follow-ing inequality

$$\gamma > 90^\circ + \phi_c \quad (13)$$

Where:  $T$  — force of resistance to shift;  $F$  — force of a friction.

Analyses have shown that at  $2t = 45^\circ$  for various values of a corner of a friction of soil on steels, a corner  $\gamma$  is in limits  $135^\circ$ – $152^\circ$ .

As a conclusion, at movement of a knife with an occurrence obtuse angle in soil that cutting with the sliding was carried out, the necessary corner of occurrence of a wedge should be within  $135^\circ$ – $152^\circ$ , thickness of a wedge of within 6 sm and the corner of its point  $2t$  within  $44^\circ$  ...  $46^\circ$ .

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**Chromatographic identification of esters on the basis of fatty acids with alcohols**

**Abstract:** The conducted chromatographic identification of the ester. It identifies the main physic-chemical properties of the ester. Included in the ester are secondary products of local industries, and are available raw materials.

**Keywords:** Greasing, ester, fat, gas-liquid chromatography, distilled fatty acid, fusel oil.

Currently, significantly increased the use of synthetic fatliquor-ing substances for the fattening of the various kinds of skins. This is

due to change and reduction the raw material base of natural fats. However, synthetic fatliquoring cannot fully replace natural fats,

especially in the fatliquoring of leathers chrome tanning. In this regard, there is a need to study the possibility of using natural fats, not previously used for fattening of leather [1–2].

Gas-liquid chromatography is one of the fastest and most accurate method quantitative analysis of various substances, including fats. The literature reports primarily on hydrolytic splitting of these substances. The hydrolysis of fats is carried out in hard conditions with elevated temperature and leads to various artifacts [3]. So, formed during the hydrolysis of fats, fatty acids undergo a series of transformations, the depth of which depends on the structure of the acid and exposure to external factors [4], which in turn can be the cause of the distortion of the results of the GLC.

In recent years, studies on the replacement of natural food and fats used in the manufacture of leather, synthetic fatliquoring agents. The main problem is obtaining synthetic fatliquoring substances that are similar in structure and composition to natural fats. Such natural fatliquoring materials, such as fish oil, technical fats and oils are mixed triglycerides, composed of various saturated and unsaturated fatty acids. The compositions of the synthetic

fatliquoring substances can be directed to change by varying the ratio of individual components, in particular of fatty acids. This requires knowledge of the qualitative and quantitative composition of natural fats.

One of the most rapid and accurate methods if quantitative analysis of components of fats: hydrocarbons, aliphatic alcohols, fatty acids, esters, etc. — is a gas-liquid partition chromatography. Mixtures of fatty are acids analyzing, translating them before the separation of methyl esters that are more volatile than the free acid, and not have the ability to time results [5].

The aim of this work was to study if the quantitative and qualitative composition of the obtained ester and the study of the application of the method of gas-liquid chromatography for the analysis of fats contained in the skin.

Research synthesized esters on the basis of isoamyl alcohol and oleic acid, also the ester of distilled fatty acids with fusel oil.

A preliminary analysis of the samples of esters was performed according to standard procedures. The results of the analysis are given in table. 1.

Table 1. – The main physic-chemical properties of the ester

№	Parameter	Ester on the basis	
		isoamyl alcohol and oleic acid	isoamyl alcohol and oleic acid
1	Moisture and volatile substances,%	6,0	2,8
2	Acid number, mg KOH/g	15,52	89,9
3	Iodine number	34,7	31,9

Fat acid composition was determined by gas-liquid chromatography. For the separation of fatty acids with a large number of carbon atoms used the method of inter etherification with methanol in the presence of a catalyst of potassium hydroxide.

Gas chromatographic analysis was performed on the device «Chrome 4» with the thermal conductivity detector in isother-

mal mode under the following conditions: steel spiral column length of 2.75 m and a diameter of 3 mm filled chromos orb W (80–100 mesh.) with 10% E-30 as a stationary liquid phase, temperature of the evaporator 210, column 200, cathetometer 230 °C; carrier gas helium, 40 ml/min, the speed of the chart tape 240 mm/h, sample volume of 6 µl.

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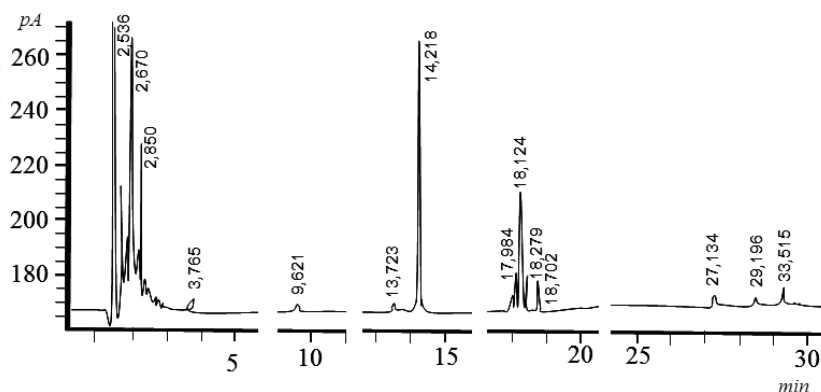


Figure 1. Chromatogram of the ester on the basis of isoamyl alcohol and oleic acid

The resulting esters decomposed by 20% aqueous  $H_2SO_4$  solution. Fatty acids were extracted three times with diethyl ether. Then the ether extract was washed with distilled water until neutral environment, dried over sodium sulfate, then the ether distilled. Fatty acids were methylamines diazomethane. The purification of the resulting methyl esters was carried out in a thin layer of silica gel in the solvent system hexane: ether: acetic acid (7:3:0,1), area of methyl esters were shown in pairs J2. The area of methyl esters from the silica gel was collected in a flask and methyl esters stripped of chloroform, which is then distilled. Methyl esters dissolved in hexane and analyzed on Agilent Technologies 6890 N with flame ionization detector using capillary column length of 30 m coated with

a non-polar phase HP-5 at a temperature of from 50 to 250 °C. Carrier gas — helium, 30 ml/min. identification of the esters was carried out by retention time model of methyl esters produced in the same conditions of gas-liquid chromatography.

In Fig. 1 and 2 show chromatograms of fatty acid entering the composition of the studied esters.

Peak identification was carried out both on the net standard methyl esters of fatty acids.

To determine the relative retained volume were calculated against the retention time of the analyzed acids by retention time of standard acid. Standard quality took the retention time of methyl ester of caprylic acid.

## Analysis of FAMES

In table 2. The qualitative and quantitative characteristics of the chromatogram of esters

Table 2. – Qualitative and quantitative characteristics of chromatograms esters

Peak#	RetTime[ <i>min</i> ]	Type	Width, [ <i>min</i> ]	Area [ <i>pA*s</i> ]	Height [ <i>pA</i> ]	Area %
Ester on the basis of isoamyl alcohol and oleic acid						
1	2,536	BV	0,0304	3,42982	1,57356	0,66324
2	2,670	VP	0,0242	3,60654	2,18584	0,69741
3	2,850	VB	0,0248	10,06519	5,94011	1,94634
4	3,765	BB	0,0269	1,93937	1,08068	0,37502
5	9,621	BB	0,0439	12,22303	4,32937	2,36361
6	13,723	BV	0,0461	6,00510	2,11894	1,16123
7	14,218	BB	0,0477	202,44965	64,36129	39,14842
8	17,984	BV	0,0543	23,18252	6,71003	4,48289
9	18,124	W	0,0475	146,28067	45,45841	28,28682
10	18,279	VB	0,0694	33,83310	6,13316	6,54243
11	18,702	BP	0,0503	49,62173	15,53219	9,59553
12	27,134	BP	0,0532	9,65382	2,73345	1,86679
13	29,196	BP	0,0477	3,91331	1,12180	0,75673
14	33,515	BP	0,0615	10,92973	2,38160	2,11352
Totals:				517,13359	161,66044	
Ester based on distilled fatty acids and fusel oil						
1	2.533	BV	0.0187	4.00287	3.39923	0.58614
2	2.559	w	0.0181	2.91229	2.41709	0.42645
3	2.607	vv	0.0271	3.78267	1.99272	0.55390
4	2.667	VP	0.0253	7.79235	4.71795	1.14103
5	2.846	VB	0.0252	22.43686	12.95105	3.28543
6	2.990	w	0.0241	1.85107	1.12871	0.27105
7	3.034	VP	0.0366	3.39705	1.33699	0.49743
8	3.515	VB	0.0311	2.25341	1.09140	0.32997
9	3.759	BB	0.0286	4.35020	2.35006	0.63700
10	9.614	BB	0.0445	10.83164	3.77702	1.58608
11	13.718	pp	0.0393	2.81296	1.04896	0.41190
12	14.220	BP	0.0502	330.52432	103.62777	48.39862
13	17.982	BV	0.0529	51.28445	13.95032	7.50957
14	18.120	w	0.0513	136.61314	39.58712	20.00424
15	18.268	VB	0.0655	48.18110	9.44490	7.05515
16	18.695	BB	0.0489	33.09858	9.93589	4.84662
17	27.139	BP	0.0485	12.97935	3.74252	1.90056
18	29.193	BB	0.0443	3.81656	1.16289	0.55886
Totals:				682.92090	217.66259	

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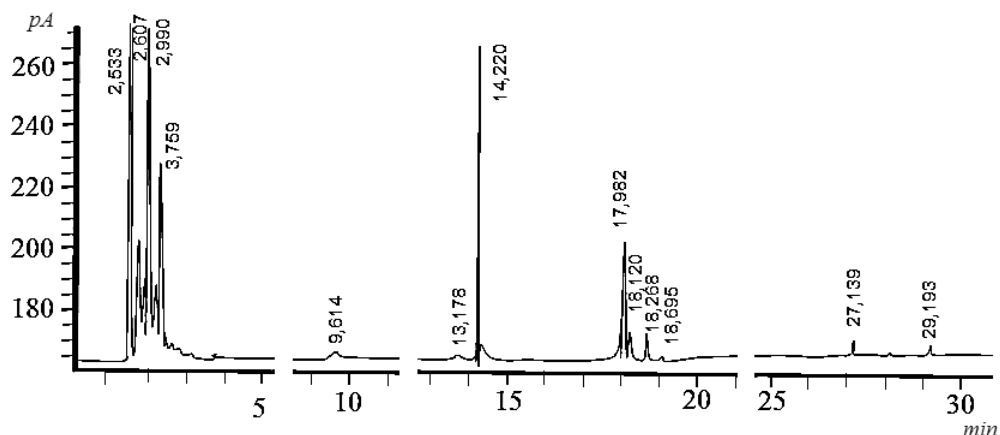


Figure 2. Chromatogram of the ester on the basis of distilled fatty acids and fusel oil

For the quantitative determination of the content of each fatty acid in the mixture using the method of internal normalization of the areas of the peaks take the sum of the areas of all peaks as 100%.

On the basis of the conducted analyses were the main composition, calculated mass fractions of the individual components of the fatty acids included in the ester are shown in table 1–2.

Table 2. – The compositions of the major fatty acids are constituent into ester

№	Fatty acid	Code acid, C <sub>n</sub>	Ester on the basis	
			isoamyl alcohol and oleic acid	distilled fatty acids and fusel oil
1	Myristinic acid	C <sub>14:0</sub>	2,77	1,90
2	Palmitoleic acid	C <sub>16:1</sub>	1,36	0,50
3	Palmitic acid	C <sub>16:0</sub>	46,06	58,50
4	Stearic acid	C <sub>18:0</sub>	11,28	5,85
5	Oleic acid	C <sub>18:1</sub>	<b>32,26</b>	<b>24,18</b>
6	Linoleic acid	C <sub>18:2</sub>	5,27	9,07
$\Sigma_{\text{saturated}} = \text{fatty acids}$			60,11	66,215
$\Sigma_{\text{unsaturated}} = \text{fatty acids}$			39,89	33,75

According to the analytical thin-layer chromatography on Silu-  
fol plates in the solvent system hexane: ether: acetic acid (7:3:0,1)  
in the sample of air on the basis of isoamyl alcohol and oleic acid are  
present mainly esters of fatty acids, also, in the sample of air based  
on the distilled fatty acid with a fusel oil is present, the same fatty

acids in roughly equal numbers.

Thus, it can be argued that the studied Kanye esters on the basis  
of isoamyl alcohol with oleic acid and distilled fatty acid with a fusel  
oil saturated and unsaturated fatty acids predominantly of a series  
of C<sub>16</sub> – C<sub>18:1</sub>.

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## New aspects of reliability function of irrigation pumping stations

**Abstract:** This paper presents problems of safety of operation of pumping stations. In particular, the security conditions of the pumps, pumping water contaminated with oil, fins, dust, mineral products are given.

**Keywords:** reliability, safety, wear, pumping station, equipment, destruction, fin, environmental requirements.

As you know, the creation of a network of irrigation in arid zone is associated with the development of an irrigation machine. Safety of operation of pumping stations (PS) can be achieved through the implementation of the set of conditions, ensuring minimum impact on the external National Assembly (NA) related to the state of water resources and the impact of the National Assembly themselves on environmental objects. Because ultimately, the construction and operation of the entire complex hydraulic structures is carried out for the management of water resources in order to improve people's quality of life.

Among the conditions of safety of operation of the complex include:

- The amount of water needed for the sustainable functioning of the structures related to water consumption. Violation of the efficiency of operation of the National Assembly, caused by a shortage

of water resources directly affects the reception of food, and other components of the quality of life of the population. Particularly acute, this problem in our country, where a lot of the water sources is transboundary waters.

- High-quality water resources. On the functioning of the National Assembly of resistance affects the chemical composition and properties of water. When the consumption of water in the various processes may be failure of the material with which it is in contact.

When operating in the National Assembly enters water sources, as is commonly believed, the regulatory clean water, with a high temperature regime. However, water is, contaminated oils, fin, dust, mineral products. Even if their content of the water does not exceed the maximum permissible concentration norms and other regula-

tory indicators, it may be damaged ecological status of water bodies. Fever causes direct damage to biological state of the reservoir.

- Minimizing the risk of exposure to the operation of the National Assembly on the environment objects. It risks the number, the impact on the environment and entailing negative social and environmental impacts include: yield land of order, suitable for different activities, depending on the priorities in the area (cultivation of agricultural products, various kinds of crafts), the impact on the traditional way life conflict situations involving the use of water and energy resources.

There are regulations governing exposure to corrosive water and suspended solids in the water. However, there are no standards for the content of other substances in water acting on the NA elements depending on types of materials.

Every year, the National Assembly of irrigation systems in the Republic consumed up to 5–6 bln. KW/h, not counting the diesel fuel. Reducing the power consumption for the National Assembly up to about 10–15% is possible, mainly due to power management systems, water lifting machine (WLM). Due to the sharp rise in prices and the growing scarcity of energy resources to the fore the problem of reducing their consumption of the National Assembly. Lack of priority works on this problem makes it impossible to optimize the NA mode at the present level of exploitation.

The main reasons for this are:

- high content of abrasive particles and fin in the pumped water, harsh climatic conditions associated with high temperature water and air;
- large size and water flow rate in the flow path elements, large water supply and electric power units, the complex transition processes accompanying their operation;
- structural disadvantages of hydraulic machines and hydraulic structures, including non-effective technical water supply system;
- imperfect organizational and technical level of operation of pumping units and structures, science-based methodology, regulatory and other technical document management workflow water lifting and environmental conditions of the equipment and operating personnel.

The need for energy-efficient pumping systems are usually justified by technological and economic factors. Currently identified environmental aspects. Large pumping stations are very energy-in-

tensive facilities. They annually spend about 20% of electricity generated, that the CIS Republics is about 300 billions KW/h per year.

Electricity production has an adverse effect on the environment [1; 2].

With an annual growth of electricity generation in the 3–4% of the commissioning of new generating capacity as a result of energy-saving mode to the NA may be reduced to 1/3. As a result, the burning of 1.8–2 million tons of fuel equivalent, or 2–3 million tons of coal will be prevented real. This will provide significant environmental benefits by reducing harmful emissions into air and water. Furthermore, these systems reduce the probability of occurrence of pressure shocks, prevent the destruction of pipelines and, as a consequence, the spout to the surface water and in water.

An important consequence of the application systems in the reconstruction is to increase unit capacity controlled pumps that provides additional energy savings and reduces the amounts of PS technology buildings by 15–20%. At the same time the land is released for other purposes, for example, to increase green areas [2; 3].

The main difficulty in the planning of energy-saving mode is to construct an adequate mathematical model of the current system. Identification of the model is carried out by successive approximations using the results of field measurements of WLM resource costs.

Further work is underway in the following areas:

- Expansion and identification of water-supply design scheme NA node structures;
- Development of management options WLM with the introduction of the scheme in new media management and optimize the work of the National Assembly members;
- organization of the system of operative information gathering and processing.

In practice, operation of the National Assembly controlled 30–40% of the total number of parameters to be monitored, which will undoubtedly worsen the environmental aspects of the units as PS operating mode is changed in accordance with the schedule of water consumption and due to other factors.

In general, the quality of the pumped water is characterized by a set of n — parameters; concentration of suspended particles floating bodies, chemical properties, density, temperature and others.

The combination of these parameters forms an n-dimensional vector  $x(a_1, a_2, \dots, a_n)$  the quality of the pumped water (see Table).

Table – Conditional evaluation of the quality characteristics of the pumped water at different criteria of its state:

Condition of swapped water	Estimation quality in ball	Quality scores in water quality parameters	
		Turbidity stream, kg/m <sup>3</sup>	Saturation of the fin flow
Absolutely	4	to 0,5	to 0,05
Clean	3	0,5" $\rho < 1,5$	0,05" $\delta < 0,3$
Moderately polluted	2	1,5" $\rho < 3$	0,3" $\delta < 0,6$
Strongly contaminated	1	more than 3	more than 0,6

We distinguish two main parameters:  $\rho$  — turbidity stream;  $\delta$  — saturation of the fin flow.

$$\rho = \frac{R}{Q}; \quad \delta = \frac{W_{n.m.}}{W}$$

where R — suspended sediment flow; Q — water flow, PS feed;  $W_{n.m.}$  — the amount of floating debris; W — the amount of runoff.

In recent years, there has been realized, and a tendency to create small areas of local farmers irrigated plots. In this regard, possible growth of the applicability of the National Assembly of mobile diesel driven. Being a mobile pumping equipment for rapid creation

(with minimal time and money) of the irrigation system and irrigation organizations are on site have no support structures, including ensuring environmental safety; settling a playground paved for ease of operation. However, the National Assembly are the sources of pollution by hazardous substances — oil, as in accordance with its functional purpose, they are located directly on the banks of the water body that is located in the zone of the coastal security band, within which the existing legislative instruments set high requirements to protect water bodies from pollution to all activities [1; 2].

From an environmental point of view, most of the large pumps and diesel pump units especially type SNP-500/10 assessment ex-



perts may be in the near future more dangerous because of the progressive deterioration of sealing knots and large leaks of petroleum products in the pumped water.

In order to ensure the protection of surface and groundwater when applied to irrigation systems, diesel SNP can formulate the following environmental requirements:

1. Must be assessed environmental risk and possible contamination of the site and the scale of the water body, namely, determine the amount, types and dynamics in time savings waste petroleum products, analyzed options for emergency use of petroleum products on the SNP and the estimated volumes of spill.

2. On-site SNP should be provided to exclude the oil spill spreading beyond the technological platform, their collection system, capacity for temporary storage, and other devices that prevent flow of oil into the water bodies.

3. The design of the outer part of the fuel system, cooling system and lubrication should be tight, that is intended to prevent the flow of oil products and getting them to the soil, surface water and groundwater.

Since the oil consumption is approximately 6% of the fueling, the amount of lubricating material spilled during filling is mecha-

nized 15 ... 20%, and when unpowered — 5 ... 10% of the total fueling and lubricants [2]. Diesel fuel losses due to leaks in the fuel system connections are 0.1 ... 0.4% filling volume. During maintenance, the amount of pollution it is advisable to take a share of the total volume of polluting products — at a rate of 5%.

Environmentally the most dangerous emergency situation may occur if the diesel fuel in the fuel tank, pour out completely. Oil spill partially infiltrate into the soil (at the site of the SNP stand to the water source), the rest will fall into it. In this case, the situation will be of catastrophic proportions for water sources, including the nature of evaporation due to the appearance of the surface film.

**Conclusions:** On systems pumping irrigation and other waterworks to assess and improve the quality of the pumped water is recommended to use the developed dependencies and requirements. To enhance the security and stable operation of the National Assembly is recommended: to develop regulations that determine the properties of water, do not lead to equipment wear and fracture of materials; methodology for integrated assessment of the degree of risk from exposure to inappropriate quality of the resource at the NA operation.

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## Section 13. Transport

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### The use of diesel fuels with improved low temperature properties in winter conditions

**Abstract:** In work is studied influence of the hydrocarbon composition sample diesel fuel on their lower temperature characteristic. They are received new depressor of the additive, experimental studied influence their concentration on the temperature pour sample diesel fuel.

At present powerfully increased need for diesel oils in connection with growing cargo and bus park.

**Keywords:** Diesel oil, temperature of the clouding and pour depressor of the additive, concentration additive hydrocarbon composition, compatibility influence natures depressor additive, paraffin hydrocarbons, physico-chemical characteristic depressor extra blend efficiency depressors additive.

The Buses, trucks and is cherished-building technology consumes all year round diesel oil. However the certain problems appear at winter period of the usages.

It is known that in hydrocarbon composition of the diesel oil contents paraffin hydrocarbon reaches 30–40%. Also known that at reduction of the temperature paraffin crystals have formed, this brings about clouding fuel.

When functioning working the diesel engine crystals paraffin ram the times a filter fine peelings decreases presenting a fuel, is broken mixture formation. Under more low temperature educated crystals paraffin accrete, form the framework and fuel freezes.

Usually in practice for the reason achievements of the low temperature of pour diesel oil conduct dewaxing or add in diesel oil les octane petrol, kerosene.

However it is herewith spent valuable oil products increases the wear-out of the cylinder groups and fire risk.

One of the most efficient ways of the improvement lower temperature characteristic diesel fuel and expansions of their resource is an use the chemical join — an depressor additive. Exist the different theories of the action depressor additive [1; 2].

The modern concept of the mechanism of their action comes from that that they storage batteries as usual superficially-active material on faces crystal n-paraffin and disturb its growing in point, where concentration depressor most, growing of the crystal the brakes are going and crystal grows toward the least concentration depressor on corners that promotes formation such original forms, as dendrite. Such change the form crystal n-paraffin is a main reason of the reduction of the temperature of the forming the spatial framework.

With thread “Chemical technology” us are developed new depressor of the additive on base departure local production. There was synthesized additive variety of depressor. The preliminary studies are organized on introduction different on nature depressor in diesel fuel.

The results preliminary experiment on using depressor additive have shown that entering the additive concentration 0,1% allows to reduce the temperature of pour diesel oil before minus 27–29 C with [3].

The deep studies are organized on influence of the nature depressor additive on low temperature characteristic diesel топлива, their compatibility, determination to the most efficient concentration of the introduction additive in diesel oil, as well as influence of the hydrocarbon composition of the diesel oil on efficiency of the influence depressor additive [4].

The diesel oil for car technology get from kerosene, gasoil and diesel oil faction. Depending on correlations these faction in diesel oils sometimes exists the difference in hydrocarbon composition fuel, in connection with than will be changed and physico-chemical characteristic diesel fuel. Such as the temperature of the flash, viscosity, low temperature characteristic. So study of the influence of the hydrocarbon composition foul on their physico-chemical and working characteristic presents scientific and practical interest.

For study low temperature characteristic diesel fuel depending on their hydrocarbon composition were displayed 4 samples of the diesel oil Fergana oil refinery plant. The studies are organized on chromatograph 6890 N “Chromosomal” with masses-spectrum 5973 methods gas liquid to chromatography were explored 4 available samples fuel. The results called on experiment happen to in table 1.

Table 1. – Hydrocarbon composition under investigation sample diesel fuel

Group structure, %	Diesel fuel			
	Sample 1	Sample 2	Sample 3	Sample 4
N-Paraffins are	27	30	25	40
C <sub>5</sub> -C <sub>14</sub>	12	15,5	12	19,5
C <sub>15</sub> -C <sub>18</sub>	9	8	7	13
C <sub>19</sub> -C <sub>25</sub>	6	6,5	6	7,5
Isoparaffins	50	49	47	30
Aromatic hydrocarbons	10	10	10	8
nophthenes	12	9,5	14	12
Unsaturated hydrocarbons	1	1,5	4	10

From table is seen that on hydrocarbon composition diesel oils in determined degree differ. So, in all sample of the diesel oil contents n-paraffin hydrocarbon varies from 27–40%, is paraffin’s from 30–50% and such differences exist beside aromatic, naphthenic and unsaturated hydrocarbon.

It is known that low temperature characteristic foul basically hang from concentration paraffin hydrocarbon in diesel oils, than more contents normal paraffin hydrocarbon, that above temperature of the congelation. An organized experiments were in laboratory condition on determination of the temperature of the congelation sample diesel fuel. The results are brought on histogram.

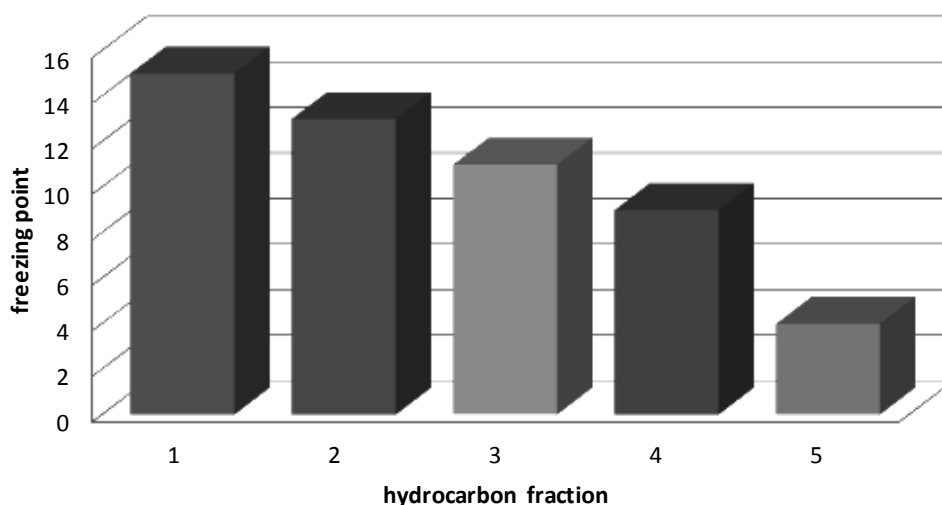


Figure 1.

Depression of the temperature of the congelation different hydrocarbon fraction:

- 1 – n-paraffin fraction;
- 2 – an aromatic fraction (the once back hydrocarbons);
- 3 – a faction bi- and tricyclic aromatic hydrocarbon;
- 4 – a faction tricyclic aromatic hydrocarbon;
- 5 – naphthenic is paraffin fraction.

From result called on by us experiment on contents normal paraffin hydrocarbon and low temperature characteristic follows

that concentration paraffin hydrocarbon directly influences upon the temperature pour diesel fuel.

The most efficient and the most expedient with economic standpoint reduction temperature of the congelation of the diesel oil is an using depressor additive.

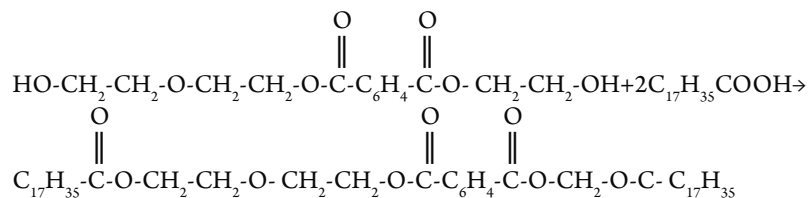
From literary sources known that introduction depressor additive in small concentration greatly reduces the temperature of the congelation petroleum.

Us explored influence of the concentrations synthesized additive on low temperature characteristic diesel foul.

Table 2. — Depressor influence additive D1–D6 on Tz sample fuel

Additive	Sample oil	T <sub>z</sub> , °C				
		Fuel sample, %				
		0	0,05	0,1	0,2	0,25
D <sub>1</sub>	1	-12	-14	-17	-14	-14
	2	-14	-16	-19	-15	-15
	3	-16	-17	-21	-17	-16
D <sub>2</sub>	1	-12	-18	-24	-27	-27
	2	-14	-19	-25	-27	-27
	3	-16	-21	-25	-27	-27
D <sub>3</sub> , D <sub>4</sub> , D <sub>5</sub> and D <sub>6</sub>	1	-12	-12	-12	-14	-12
	2	-14	-14	-16	-14	-14
	3	-16	-16	-17	-17	-16

From table is seen by that most efficiency on reduction of the temperature pour fuel renders the additive D2 at concentrations 0,1 and 0,2%.



The Results of the test have shown that when entering new depressor additives concentration 0,1% temperature of pour diesel oil falls before minus 27 29 C.

The new additive — a liquid light brown colour, well opens in diesel oils and does not fall out in sediment under retain. On rest

Before us was put delivered problem of the reception more efficient depressor additives (D7) possessing high factor quality. So studies were continued on reception new in a complicated way ethe-real depressor of the additive.

factor quality does not yield earlier synthesized additive.

Comparison got by us new additive D7 on efficiency does not yield the known foreign depressor an additive such as: "Total", "Mannol". Given are provided in table 3.

Table 3. – The Comparative results to efficiency of the action depressor additive in diesel oils

additive	Fuel sample	$T_p, ^\circ\text{C}$			
		Additive concentration, %			
		0,05	0,1	0,2	0,3
$\Delta_7$	1	-18	-29	-27	-28
«Total»	1	-12	-15	-17	-19
«Mannol»	1	-14	-16	-18	-20

Thereby, considering efficiency of the new additive D7, uncomplicated technology of the reception and raw materials base, we sup-

pose that additive can be recommended for year diesel fuel at usages of the technology at winter period.

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## Section 14. Physics

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### New method of differential calorimetry

**Abstract:** The article discusses a developed by authors new method of differential calorimetry, the novelty of which consists in the use of pulse heating mode instead of continuous heating, which is usually used in modern differential calorimeters. This method eliminates the main drawback of modern differential calorimetry, allowing combine high heating rates with the providing the measurements in equilibrium conditions, which enable us sharp increase the sensitivity and accuracy of measurements and study those slight changes in thermal heat capacity of bodies that cannot be measured by common differential calorimeters.

**Keywords:** Thermodynamic studies, a new thermodynamic method, improving the accuracy of measurement in thermodynamics.

#### Introduction

In the solution of the problems existing in modern science and technology, thermodynamic studies, which are widely used in physics, chemistry, biology, materials science, medicine [1–3] etc., including for diagnosing cancer [4] play an important role. For the studies of this kind, calorimeters are divided into two basic groups: classical calorimeters, measuring the absolute heat capacity of bodies in the impulsive regime and differential scanning calorimeters (DSC) measuring the heat capacity difference between the research sample and the standard in the continuous heating regime. It should be noted that DSC are characterized by higher sensitivity to the heat effects and by comparatively shorter time of measurements (that can be regulated by scanning rate) than the classical calorimeters, and they are used more widely [1]. But they have one important disadvantage, incompatibility of the high heating rate with the providing the measurements in equilibrium conditions, which does not allow studying many “fine” effects. This issue was considered in work [5].

#### Results and discussion

To eliminate the above-mentioned drawback of differential calorimetry, we elaborated a new method the novelty of which consists in the use of pulse heating mode instead of continuous heating, which is usually used in modern differential calorimeters. The cursory mention of the method is given in [6].

Let us consider the pulse method in more detail. In this method, the measuring container (Fig.1) of the differential calorimeter consists of two identical cells (1), in which a sample and a standard (5) are placed. The cells are connected via thermocouples (3) that measure the temperature difference between the cells and, at the same time, provide the required thermal link between them.

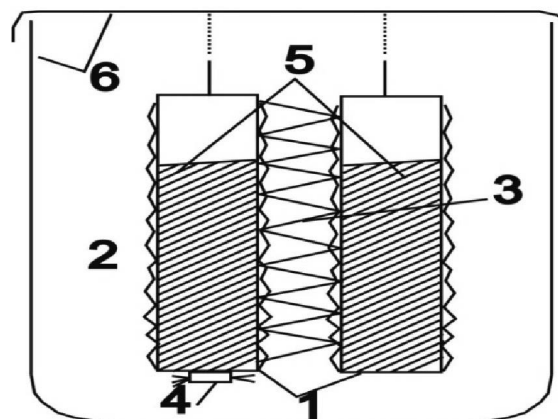


Figure 1. Container of the differential calorimeter:  
1 – Cells, 2 – Heaters, 3 – Thermocouples, 4 – Thermometer, 5 – Samples, 6 – Radiation shields

Before applying a heat pulse of  $\Delta t$  duration and after a certain time of relaxation  $\tau \gg \Delta t$ , the sample under study and the standard are in thermal equilibrium and their temperatures are similar. During the entire process of measurement, the differential container is thermally isolated by radiation shields (6), and the process proceeds under adiabatic conditions. Similar heat pulses  $Q=IU\Delta t$  are applied to both cells by means of electric heater (2). The change in cell temperature in time is described by the expressions:

$$T_1(t) - T_i = \frac{1}{C_1} \int_0^t \theta(\Delta t - t_1) p(t_1) dt_1 - \frac{k}{C_1} \int_0^t \delta T(t_1) dt_1 \quad (1)$$

$$T_2(t) - T_i = \frac{1}{C_2} \int_0^t \theta(\Delta t - t_1) p(t_1) dt_1 + \frac{k}{C_2} \int_0^t \delta T(t_1) dt_1$$

where  $T_i = T_1(0) = T_2(0)$  is the initial temperature of cells before applying the heat pulse,  $\delta T(t_1)$  is the instantaneous temperature difference between cell temperatures,  $k$  is the coefficient of heat conductivity of the thermocouples between the cells,  $p(t_1)$  is the amount of heat power supplied to each cell during the action of the pulse, and  $\theta(t)$  is the step function determined by  $\theta(t) = 1$  at  $t \geq 0$  and  $\theta(t) = 0$  at  $t < 0$ .

After relaxation, at the moment  $\Delta t + \tau$ , expression (1) takes the form

$$\begin{aligned} C_1 \Delta T &= IU \Delta t - \Delta Q \\ C_2 \Delta T &= IU \Delta t + \Delta Q \end{aligned} \quad (2)$$

where  $\Delta T = T_f - T_i$  is the temperature increment for the sample and the standard,  $T_f = T_1(\Delta t + \tau) = T_2(\Delta t + \tau)$  is the final temperature of the cells after relaxation,  $IU\Delta t = \int_0^{\Delta t} p(t) dt$  is the heat released in each

cell during the action of the heat pulse, and  $\Delta Q = k \int_0^{\Delta t + \tau} \delta T(t) dt$  is the amount of heat passed from one cell to the other (thanks to thermal link between the cells) due to temperature difference  $\delta T(t)$  at the transition from one equilibrium state to another. Finally, the difference in heat capacities is calculated according to

$$\Delta C = 2\Delta Q / \Delta T \quad (3)$$

In the experiment, the increase in temperature  $\Delta T$  can be measured with the help of a thermometer (4). The power transferring from the one cell to another can be calculated as follows:

$$\Delta Q = \int_0^{\Delta t + \tau} \delta P(t) dt \quad (4)$$

Where  $\delta P(t)$  is the power transferring from the one cell to another. As it is well-known,

$$\delta P(t) = k \delta T \quad (5)$$

Where  $k$  is the heat conductivity of the thermocouples connecting the cells, and  $\delta T$  is the difference between the temperatures of these cells. On the other hand,

$$\delta T = \beta \varepsilon \quad (6)$$

Where  $\varepsilon$  is the emf of the thermocouples between the cells emerging due to the difference between temperatures at its ends, and  $\beta$  is the factor of proportionality depending on the thermocouple material and the number of thermocouples in the cell. Finally, we get  $\delta P(t) = k\beta\varepsilon$  and, substituting this expression in Eq. (4), we obtain

$$\Delta Q = k\beta \int_0^{\Delta t + \tau} \varepsilon(t) dt \quad (7)$$

As it was said above,  $k$  and  $\beta$  are the constants of the device depending on its design. They are determined by a special calibration experiment and remain constant from a test to a test. Then, having measured only the thermocouple emf  $\varepsilon$ , one can calculate the  $\Delta Q$  and the heat capacity difference between the samples.

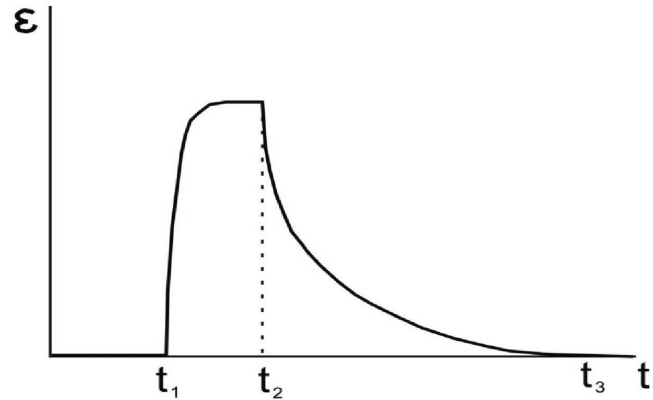


Figure 2. The dependence of the emf of thermocouples versus time for a warm-impulse

Before the heat pulse is supplied, the cells are in a thermal equilibrium, they have the same temperature, and the emf of thermocouples will be zero if parasitic emf in conducting wires is excluded. At moment  $t_1$  (Fig. 2) electric heaters 2 (Fig. 1) switch on, and the same amount of heat  $Q=IU\Delta t$  enters the cells for the  $\Delta t=t_2-t_1$  time (Fig. 2). The cells heat up unequally because of the difference in their thermal capacities. As a result, the temperature difference  $\delta T$  arises between them, which, as shows formula (6), will cause the emergence of emf at the ends of thermocouples connecting these cells. After switching off of the heaters at moment  $t_2$ , the cell temperatures begin to level off due to a thermal link between the cells via the thermocouples. After a certain relaxation time  $\tau=t_3-t_2$ , the cell temperatures will equalize, and the system will again come into thermal equilibrium. Having calculated the area under the curve by integration, we can calculate the amount of heat transferred from one ampoule into another according to Eq. (7). As you can see, the pulse heating method allows developing the high heating rate during a short pulse and, at the same time, carrying out the measurements under the equilibrium conditions, because the system is in the thermal equilibrium at the beginning and after the heat pulse.

### Conclusions

The pulse heating method eliminates the main drawback of differential calorimetry, allowing combine high heating rates with the providing the measurements in equilibrium conditions, which will enable us to study those slight changes in thermal heat capacity that cannot be measured by common differential calorimeters.

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## Thermodynamic properties of LSCO Cuprates in the Nonsuperconducting State

**Abstract:** The investigations of low-temperature heat capacity in pure ( $y=0$ ) and Zn-doped  $\text{La}_{1.84}\text{Sr}_{0.16}\text{Cu}_1\text{yZn}_y\text{O}_4$  samples ( $y=0.033$  and  $0.06$ ) have been performed by high-precision differential pulsed calorimeter (DPC) measuring the heat capacities under the thermodynamically equilibrium conditions in contrast to the commonly used differential scanning calorimeters (DSC). The anomaly of a low-temperature heat capacity which has a wide peak form and is related with Zn impurity was observed in the nonsuperconducting state in agreement with the neutron scattering experiments. The shape of anomaly indicates that Zn-induced magnetic ordering transition is of the first order transition type in the investigated cases. The anomaly shifts to higher temperatures with the increase of Zn content as it is characteristic of the anomalies of magnetic nature in contrast to anomalies of phonon heat capacity.

**Keywords:** Calorimeter, differential calorimeter, High temperature Superconductors, Superconducting Cuprates.

### Introduction

There exists the suggestion that the dynamic spin correlations (spin fluctuations) should play an important role in the mechanism of high-temperature superconductivity [1; 2]. To clarify the situation in this direction, the influence of magnetic and nonmagnetic impurities in the high-temperature superconducting cuprates  $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$  (LSCO) have been intensively studied [3].

The neutron scattering experiments [4] show that in monocrystalline  $\text{La}_{1.79}\text{Sr}_{0.21}\text{Cu}_{0.99}\text{Zn}_{0.01}\text{O}_4$  sample in the non superconducting state there appear the elastic peaks indicating that Zn influences on AF dynamic spin correlations and stabilizes them into the static ones.

In the  $\mu\text{SR}$  investigations of Zn-doped LSCO [5] it was also observed that the AF magnetic order appears in  $\text{La}_{2-x}\text{Sr}_x\text{Cu}_{1-y}\text{Zn}_y\text{O}_4$

samples in non superconducting state at  $x=0.21$  and  $y=0.01$ . The thermodynamic investigations of Zn-doped LSCO cuprates were carried out both with the usual pulsed calorimetric technique measuring the absolute heat capacity of samples [6], and with the differential scanning calorimetry (DSC) measuring the heat capacity difference between the investigated and the reference samples [7], however, the data of thermodynamic characteristics of this phenomenon are not available. The cause in our opinion is not sufficient precision of used techniques.

### Results and Discussion

We made the measurements of low temperature heat capacity in pure and Zn-doped LSCO samples by the original, created with us, differential pulsed calorimeter (DPC) with high precision

[8], a brief description of the first, imperfect experimental version of which was given earlier [9]

Figure 1 clearly shows a wide maximum of the heat capacity as required by neutron scattering experiments.

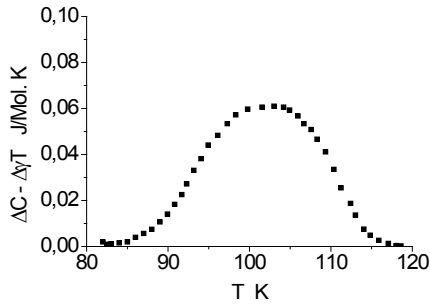


Figure 1. The anomaly of the heat capacity appropriate to the concentration of zinc;  $-y = 0.033$

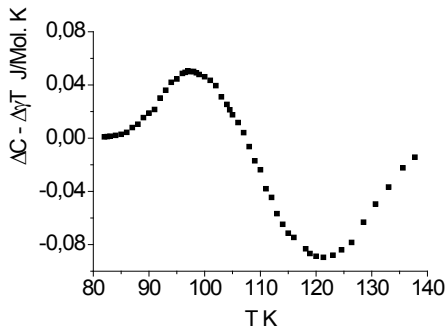


Figure 2 The difference of the heat capacities between the samples  $\text{La}_{1.84}\text{Sr}_{0.16}\text{Cu}_{0.967}\text{Zn}_{0.033}\text{O}_4$  and  $\text{La}_{1.84}\text{Sr}_{0.16}\text{Cu}_{0.94}\text{Zn}_{0.06}\text{O}_4$

To determine the concentration dependence of the effect we measured the heat capacity difference  $\Delta C(y_2, y_1, T)$  between two non-superconducting samples  $\text{La}_{1.84}\text{Sr}_{0.16}\text{Cu}_{1-y}\text{Zn}_y\text{O}_4$ , with different content of Zn ( $y_2=0.033$  and  $y_1=0.06$ ). Fig.2 shows that this dependence is of a complex form  $\Delta C(y_2, y_1, T) = \delta C(y_2, T) - \delta C(y_1, T)$ , where each  $\delta C(y, T)$  has the form of a wide peak.

This means that in Zn-doped LSCO cuprates there appears the anomaly of heat capacity  $\delta C(y, T)$ , having the form of a wide peak. As  $\delta C(y_1, T)$  peak is shifted to the high temperatures relative to  $\delta C(y_2, T)$  peak, on the plot of Fig.2 there appears a sinusoidal like curve. The experimentally observed shift of the maximum of  $\delta C(y, T)$  along the temperature with the increase of impurity concentration is not characteristic of the anomalies of a phonon part of heat capacity of materials [10], just on the contrary, it is related with the magnetic nature of this contribution in agreement with the neutron scattering experiments.

### Conclusion

Summing up the above-said, one can conclude that in LSCO ceramic superconductors, at the introduction of Zn in nonsuperconducting state, the anomaly of low-temperature heat capacity related with Zn-induced static spin correlations was observed in agreement with the neutron scattering experiments. The shape of anomaly indicates that Zn-induced magnetic ordering transition to the static spin correlation is of the first order transition type in our investigated cases. The value of this anomaly at the investigated concentrations increases almost proportionally to Zn concentration and shifts to higher temperatures with the increase of Zn content, as it is characteristic of the anomalies of magnetic nature, in contrast to the anomalies of phonon nature.

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## Section 15. Philology and linguistics

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### Intercultural learning and methodical — didactical aspect

**Abstract:** the article will address the didactical and methodical part of the intercultural process of teaching and learning foreign languages. Some of the criteria to be considered for an intercultural learning of a foreign language, based mainly on the German language will be briefly presented.

**Keywords:** intercultural, learning, didactics, foreign language.

The “intercultural learning” concept, as well as other concepts related to it, had their development in the early 80s. Since then, intercultural learning, would be no more a new concept in the literature of pedagogic field. However, it should be noted that so far, it doesn’t exist a clear definition of this concept and accepted by all. As a result, they have developed different theoretical approaches regarding intercultural learning [1, 23]. To approach as close as to learning principled orientation, but also to the needs of students, the lore of the country began to take more and more important in foreign language learning, in the center of which is the culture that students intend to take, as well as what they possess, and that serves as a starting point. In this regard, it was important to strengthen not only communication skills of the students, but also their intercultural one [2, 141]. Therefore, it can be said that “intercultural learning” is understood as a process that aims to achieve intercultural competence.

In discussions about the didactics of foreign languages, intercultural learning is closely related to the learning of foreign languages. It is taken as a necessary part of learning a foreign language, because learning a foreign language in itself is intercultural, and this in all its dimensions [3, 91]. In this way, intercultural learning should be included in the foreign language learning. However, on the other hand, foreign language teaching includes elements that are not related to intercultural learning. Another discussion point that intercultural learning, cannot be seen as an integral part of foreign language learning, since learning a foreign language is understood by itself as a process of intercultural learning. During the learning of a foreign language, anyone simultaneously is learning a foreign culture. From this viewpoint, intercultural learning of a foreign language needs to develop skills and strategies related to foreign cultures. It is therefore necessary that the learning of a foreign language has an intercultural orientation in preparing the lesson [4, 34].

Intercultural learning is a learning process between two individuals of different cultures within the intercultural communication. In didactic terms, this means, mainly that, the students of the respective culture to be more aware and to gain more knowledge about foreign culture.

Intercultural learning is successful only when a mutual intercultural relation is established. On one hand, this includes knowledge of foreign cultural standards and on the other hand, it includes the ability to perceive value and behaviors, to think and judge as the bearer of another culture. But it includes also our emotions and feelings that appear in foreign cultural situations. There are many definitions

of the „intercultural learning“ concept, but also enough attempt to better explain it. „Intercultural learning“ is closely related to many other concepts such as „intercultural competence“, „cross-cultural misunderstandings“ and „intercultural communication“.

To emphasize the importance of intercultural learning in foreign language teaching is an important aspect of education policy. This comes in the context of rapidly changing of social structures toward multicultural societies, bringing new tasks and objectives to solve the current inadequate educational system. Crossing the boundary and contacting with members of another culture makes the language to play a decisive role. However, it should not be understood as an instrument of transmission of information — unfortunately continues to be treated so even nowadays — but as one of the policy instruments, most relevant to the present, which paves the way for access to an intercultural understanding and cross-cultural harmony. Given that such intercultural meetings do not always result in positive, sometimes there are undesirable cases that occur by non properly recognizing the norms, values, actions or behavior and communication styles of foreign culture [5, 54].

A prerequisite for intercultural learning is to meet with other cultures, so foreign cultures. In the past, such typical meetings were realized by going in the foreign country, in the form of cultural exchanges, for study or partnership meetings. The real challenge is nowadays, since the meeting between cultures is displaced more and more in our society, almost in daily life. Therefore, intercultural learning relates to the challenges within the society, as well as with the country’s national challenges.

The civilization and intercultural learning are actually two concepts closely related among them [6, 45]. In recent years, there has been a growing involvement of intercultural learning in the concept of civilization. “*The discussion about the “Intercultural” concept, is newer in time, and discussion of knowledge about the civilization in learning German as a foreign language, is as early as even the learning of modern foreign languages*” [2, 141]. But according to Röttger [7, 18], it is not yet clear whether the concept of the civilization should be equated to intercultural learning, as many authors emphasize the differences between these concepts. According to them, civilization means acquisitions of the knowledge based on facts, and obtaining information on foreign cultures. The importance of intercultural learning begins precisely with discussions on the role of the civilization in foreign language learning.

However, we think that the recognition of the civilization is not completely the same with intercultural learning. This is because „*the knowledge about civilization involvement in intercultural learning has to do with the fact that the emotional aspects of communication between members of different cultures have always been at the center of didactics research*“ [7, 18]. Unlike the civilization, in intercultural learning it is a mutual connection between two or more persons. Another reason why intercultural learning/teaching exceeds the concept of civilization is that intercultural learning includes also the acquisition of intercultural communicative competence. It can be said that these skills in contact with foreign culture help to develop the perception and sensitivity to these cultures [6, 45].

Learning a foreign language is seen as an intercultural process. However, it must be said that an approach of intercultural concepts to the foreign language didactics has raised attention later. Intercultural approach, which had its developments from the 80s communicative approach, aims to recognize the culture and „foreign“ concept [8, 13]. With the introduction of intercultural approach, the „unrealistic“ notion of „native speaker“ was replaced by another notion „intercultural speaker“ [9]. In this regard, we should consider the rules, values, perceptions of foreign culture, attitudes towards it, in order to say the right notion in certain situations, so not to break any taboo and understand others appropriately [3, 91]. Intercultural approach to foreign language didactics is understood since the second half of the 80s as the further development of pragmatic and functional concepts in the design of didactic and methodical drafts of learning German as a foreign language. The foregoing, any foreign language learning is in itself an intercultural learning process [4, 34].

The discussion on intercultural learning and intercultural communication in particular, as well as the concept of intercultural didactic of learning a foreign language, began to receive proper attention only in the early 90s [10, 157]. Interculturalism can be conveyed in the teaching of foreign languages by listening, reading texts, music, etc. If we refer to discussions that have been made about interculturalism in didactics of foreign languages, it can be said that intercultural aspect provides a little bit, awareness to understand other people. De Florio Hansen share the opinion that „*learning a foreign language has for duty to enable the students' knowledge of the foreign culture and to create conditions for mutual understanding between members of different cultures*“ [11, 403–410]. However, it should be noted that the intercultural concept in teaching a foreign language is based on student perspective. This has to do with personal and cultural life experiences or even with general knowledge, learning traditions, the relationship between the first and second culture [12, 105].

From the above, it is clear that the culture that belongs to a language, should be passed through intercultural approaches in the teaching of foreign languages. For this reason, intercultural approach plays an important role to be closer to this new „world“. The learning of the German language as a foreign language, based on intercultural

concept should include the didactic concept of avoiding potential risks that may arise during the confrontation of both worlds. By continually comparing these „worlds“ and discussing about the intercultural concept, some aspects that students can look quite attractive and interesting come out, but also other, that can be completely unknowable to them. According to the Institute of the Curricula Development, often arises the need that the didactics of foreign languages should contain a special combination of techniques, as well as a variety of teaching methods and materials to be selected in the process of teaching and learning [13].

It is very necessary that, for the mediation and intercultural knowledge transmission, which enables the acquisition of intercultural competences by students, to use comparative methods, that highlight the changes, but also include personal experiences. The same opinion is also shared by Kastrati-Hyso [14, 101], that speaks for the approach of a comparative pedagogy between the native language A and foreign language B. This enables the students establish relationships of similarity and differences between the two cultures. Intercultural competence cannot be shown and described to the students, and moreover to be given as „homework“. But if it becomes part of classes, each teacher can create a friendly atmosphere in the classroom, which would help the students to be open, encouraging collaborative learning. „*As long as intercultural learning is understood as such, unless it can be taken over for inclusion in a catalog of learning objectives, namely to draw from intercultural learning a subject or to collect a range of knowledge and specific skills, the notion of intercultural learning can serve in multiple learning and mediating contexts*“ [3, 91]. The most important in this regard is the variety of didactic methods and instruments that need to be carefully selected and used by teachers in the organization of the lesson and to create intercultural learning environments.

#### Conclusion:

Intercultural learning is a very important process in foreign language didactics. When we talk about the didactic aspect, undoubtedly we mean also the methodical side, so the methods used for the transmission of intercultural concepts. In the above, it was presented and analyzed a general view of the term „intercultural learning“, why it is needed and for what it serves. Even in the field of intercultural learning there are different definitions, which differ very little from each other. Through various arguments, it was showed, that intercultural learning can be understood as a process aimed at achieving intercultural competence. An important part of the paper, was the analysis of the methodical and didactic aspects of intercultural learning. What further is aimed, is the presentation of the necessary methods for mediation and transmission of intercultural elements, for the way of organizing the lesson and promoting intercultural learning. It was emphasized the selection of materials that represent as closely the reality, those that are much more varied and friendly to students.

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## Quranic influence on Baytajejan poetic language

**Abstract:** We should not be surprised if we see that the Holy Book Quran is inspiring even for literary and poets as it is for people of Sharia, Philosophy, Apologetics and other fields that existed in the history of Muslims, no matter which nation they belong.

Baytajejan poets' period of time experienced a remarkable influence of the Middle East, either directly from the Quran or from known literary and poets.

This group of poets have confirmed that the Holy Book of Quran cannot be only a Book of religious teachings but also of poetic inspiration, and for this reason, we clearly see in their poems words and stories taken from the verses of Qur'an, which have enriched their poetic language and literary expressions, and this influence assures their specific poetic nature.

**Keywords:** Quran, Baytaje, influence, language, poetry.

Poets have no limits in their inspirations and they usually take impressions from anything that can be a part of their poetic creativity. They are under the influence of everything that is around them, especially when they are under the influence of reciting the God's word. "The Quran has always been admired for its restrained and grace of style, its eloquence and refinement. Its sapid prose and lapidary style are instantly recognized as ingredients of its sublime charm" [1, P. 122]. The poets of all periods during the Islamic History, "looked upon the Quran as a source of poetic inspiration, derived and borrowed from it many of their ideas, images and phrases, and based on it their political and religious arguments." [2, P. 327].

Viewed from side, the Holy Qur'an, by itself gives the impression of a rhyming prose, while its last quarter, more resembles poetry thought it is not a poetry. The rhyming vibrant, except that figured sounds, targets any content and defines the dimensions of emotional, symbolic and aesthetic meanings [3, P. 111].

Among the stylistic figures in the Qur'an, except personification, allegory and comparison, there are quite tropes such as metaphor, irony, repetition... And also, the antithesis, epithet, allusion and symbols occupy the prominent place, too [3, P. 112].

There is no doubt that the outlined and mentioned topics have impacted on Albanian Baytajes. Same religious themes of knowledge, enlightenment, ethics, moralizing, social and historical narrations will be treated by the baytajejan Albanian poet Muham-

mad Kyçyku — Çami, as in "Risala-i Bergjevi", "Erveheja", "Gurbetlite", "Bekriu" "Yusufi e Zulejhaja" etc.

Furthermore, Muhammad Kyçyku — Çami, as I have mentioned here in this article, does not hesitate at all to accept by himself that he has found the meaning of his poetic topics and words in the Holy Qur'an:

*All these highlighted words,  
 I saw them written in the Book [4, 136].*

Indeed, we find it difficult to access and mention all Baytajes that, either directly or indirectly, were affected by the Holy Book Quran, because they are many.

But, according to the old Arabian saying: "What is not reached all, cannot entirely be left", I will try, in the following, to present some Baytajes that Quran was their source of inspiration.

Zenel Bastari was strongly affected by the Qur'an, and after accusations that were made by men of Tirana and led by clerics, that he has deviated from the path of faith, he was calm to answer on these unfounded charges by saying these words:

*I trust in the perfect man  
 My direction is to Qibla and Quran,  
 I am looking forward to,  
 My brother, I need to find a (honest) man [5, P. 76].*

Sheikh Ahmad, in his poem "Mirë se erdhe shpirti revam" — (Welcome to the honest soul), says:

*Welcome to the soul,  
That came from the other,  
All creatures accepted faith,  
Your place is in Arshu Ala [6, P. 437].*

The large impact of Quran is seen in the language that was used by Baytajes and significantly influenced their creativity. Many Quranic teachings of our Baytajes were taken after they have meticulously studied them, and after that, they have given their opinions and conclusions, and then from these Quranic lessons, they were inspired and wrote their own poems, sometimes even they modified them, ie adapting to the Albanian environment and comprehension.

So, the Holy Book Quran quite influenced the Albanian Baytaje creativity but, in addition to this, we can say that they were significantly affected by the emerging Quranic stories, too and then, based on those narrations, they have created and platted their artistic and poetic words, articles and numerous verses...

Quran, as a divine book, also contains plenty of stories of various people, fate of the people, upheaval, tragedy, victory, triumph, etc, starting from Adam, as the first man on the face of the earth, until the last days of Prophet Muhammad's life.

In the Qur'an we also find stories of Adam and Eve, Joseph and Zulaikha, David (Dawood), Pharaoh (Fir'awn) and Moses (Musa), Jesus (Maseh-Isa) and Miriam (Maryam), the cataclysm (Resurrection) and many other events [7, P. 164].

No doubt that these stories, as they had influenced Arabian, Turkish, Persian, Bosnian and Indo-Muslim poets, will significantly impact on the Albanian Baytajes, too.

In the framework of this, we can talk about the field of translation studies included the Holy Quran, books of family life, religious missionary of the Prophet Muhammad, Muhammad's contemporary books, books for his stories about the descent of the Quran and the difficult road and full of sacrifices and determination to sanctions of Islam that match Hadith books, Islamic practice books and victories of Islam, books in the field of philosophy of Islam, moral and Islamic ethics, books of Islamic history, books of basic knowledge of Islam derived from Quran, Hadith, Fiqh, Aqaid, Islamic civilization etc. [8, P. 17].

Among the Baytajes, the best known in this area, namely in the use of the Quranic narratives, without doubt is Hasan Zyko

Kamberi. We have inherited many of his famous poems and manuscripts, which obviously contains such influence and narrative impact.

From the saved works of Hasan Zyko Kamberi, we have the religious poem: "Istor'i e Abraamit me Agarë, Agarë nga e cila djalë Ismailitët" (History of Abraham and Agar, Agar that from her have been descended the Ishmaeles), which clearly shows that the subject of the story is taken from the Quran which talks about the story of Abraham's wife, Hagar and their son Ishmael.

Ibrahim Nezimi (Frakulla), in his writings, also uses figures emanating from the Quran. Among these distinguished figures, such as the Prophet Muhammad, Abraham, Zakariya, Isa, then "As'habi Kiram" (Companions of the Prophet Muhammad), Abu Bakr, Umar, Uthman, Ali, Hasan, Hussein and other names and figures like Gabriel, the Hour, Paradise, Hell, the Hereafter, iman, Islam, religion, ummah, angels, satan, etc.

All these figures represent or symbolize different views, situations, images and descriptions of Islamic religious life [9, P. 48]

Ibrahim Nezimi (Frakulla), in his "Divan", says:

*Inform the entire world,  
Nezimi left no pleasure.  
Whoever serves this world,  
Will end up in hell,  
For Abraham it became a paradise [9, P. 49].*

Quran has rich phraseology and expressions and through it, the authors (Baytaje poets) express a wide range of issues. "The text of the Quran introduced complex and interchangeable characters who were no ordinary mortals and were of symbolic potential" [2, P. 246]. Quran, as the Islamic Holy Book, is distinguished by its syntagmatic character.

As a conclusion of this paper, it is possible to say that a sentence or a phrase can be explained in many variants and different types of interpretations, and this means that there is a lot of subtext rich phenomena that confirms its diversification, and for this particular reason, it has been a source for many Albanian writers, especially for the period of Baytajes. Their ability to understand the Quranic style of expression gave them an opportunity to use it in their poetic language in an easy way as they were experts on its comprehensive views and notions.

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## Section 16. Philosophy

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### Socio-cultural parameters of the “sport” phenomenon: to the question on definition of term

**Abstract:** In this article some parameters of the phenomenon of sport with the point of social and cultural analysis are considered. Also characteristics of these parameters are given and philosophical component of sport is determinate in it.

**Keywords:** sport, socio-cultural status, philosophy of sport, humanization, harmoniously forming of person.

The need for a philosophical understanding of the phenomenon of sport due to the fact that the latter had long ceased to be a special case of culture, with a few professionals, for whom sport is implementation of number of physical exercise in order to achieve a certain result. Socio-cultural status of this phenomenon today is that the issue may not be limited to its consideration of purely in the plane of physical culture. “In modern science appeal to the processes of socialization of physical activity as a process, a review of which should begin analysis in the study of the most fundamental questions of the formation and development of the human individual and society as a whole, it is very common. With consideration of the problems of physical culture, in fact, begins the formation and study of the processes of human culture as such. <...> You can also say that the first human ability which is in the process of evolutionary and historical (and, probably individual) human development is humanized, it is its motor, physical, bodily ability” [1].

Colossal ethical and aesthetic, ideological and, above all, the ideological potential of sport is recognized by all, and is actively used in any cultural and historical complex as a significant element of the formation of the basic structures of social consciousness, norms, values, ideals, which give society the vector of development. The relevance of the actual philosophical consideration of sport, evaluation and comparison of the Western (European) and Eastern paradigms within comparative humanitarian research methodology and due to the enormous humanist potential of sport, of particular importance at the beginning of the XXI century. Rehabilitation of humanistic principles in the culture, the idea of the whole man, in which the material (somatic) would have stayed in a dynamic balance with the unity and spiritual, is once again becoming urgent need, despite the apparent immutability of the gains of the Modern and Contemporary Age — the values of tolerance, humanism and liberalism. And it is not that the past dilapidated, lost their value, and that altered their own media, the subject of social and cultural process — a human.

These changes are due, on the one hand excess technologization of life in all its manifestations, which was the natural consequence of the triumph of myths of progress, with its ability to “change ... of human nature and the fact — the transition to a “post human” stage of history” [2]. On the other hand — the dominance in the minds of modern man abstract and theoretical schemes, like the last, resting on a long tradition of European metaphysics and excess ontologism.

Together, these two trends are reducible to the subject of artificial expansion with respect to a person, his consistent deconstruction, with the prospect of replacement by a hybrid analog. At this stage, deconstruction opens truly unique possibility once and for all does away with the traditional interpretation of human subjectivity. We see triumph of “... the expansion of the Other as our non-existence, if we understand that the virtual-digital world capital” carbon “life is replaced by a functional immortality information and holistic body-spiritual man it is inadequate” [3].

Philosophical significance of deconstruction lay in the fact that he criticized the whole of classical philosophy, while announcing the path traversed by it wrong. “Deconstruction, in fact, has positioned itself as anti-philosophy, structuralism and poststructuralism-anti-gumanism and “artistic” postmodernism as an anti-art. In broad historical terms, he has post-culture with all the ensuing consequences” [3]. The time in which we live today — is a “Great, comprehensive nihilistic revolution!” [3].

The process of deconstruction as a human subject includes its physical and spiritual aspects of it. One of the essential elements of this process is the postmodern idea of “body without organs”. In postmodernist sense it is a “... somatic body. It is formless, structure less formation, a kind of “cleared place” for drawing characters or the implantation of chips. “Protoplasmic substance”, “intensive environment”, “kinetic amoeba” — this is its typical definition in postmodernism” [4]. “The body without organs”, “the body without a space” these are the tumors of postmodern mentality. “The body without space” along with the text becomes vice reality of things and obscures other ways of human being. “All that is happening and everything that speaks, takes place on the surface. The surface, as little research and know the depth and height of serving as nonsense. Double meaning of surface, continuity and underside face of the alternate height and depth. Behind the curtain is nothing but nameless mixtures.

The surface is like misted glass, on which you can write with your finger. The philosopher is no longer cave creature and not the Platonic soul-bird, and the flat surfaces of the animal — a tick or a flea. What do you call this new philosophical accomplishment? Perhaps a perversion of that, at least in line with the system of provocations of this new type of philosopher, if it is true that perversion implies a special art of surfaces” [5].

The result of this process is the transformation of human into a singularity, in a kind of pre-individual unit. "Impersonal and pre-individual are free nomadic singularities. Deeper than any bottom are skin and surface. Here, a new type of esoteric language, which is itself a model and reality" [5, 190]. In this global process of displacement of the natural to the periphery of social and cultural life of the sport is one of some exceptions where natural in man continues to be the most important value and is not replaced by a kind of surrogate. Thus, the "environmental" value of sport to preserve the natural man can not be overestimated.

Another important argument in favor of philosophical reflection with regard to the sport due to the fact that, from our point of view, it concluded a kind of cultural code of a civilization in concentrated form representing its ethos, and that is not always a clear dominant basis, which is the general cultural nature and stimulates the activity of the individual in all its forms and manifestations. Highly no accident that the philosophy of sport as a separate line in the development of this basic academic discipline was predefined by kind of intellectual revolution in the New World, which carried out the leading figures of the American philosophy of pragmatism, and especially — John Dewey (1859–1952). The essence of the pragmatic philosophy is to refocus and some philosophical reflection of social practice with abstract metaphysical schemes, trying to grasp and to express the universal in human in the form of certain categories of individual, subjective and unique in it, so that is specified socio-cultural status of the individual, its role and functions in the social practice.

Problem sport in its philosophical dimension encourages a truly boundless possibilities for the study of this and related topics. "There is opens the possibility of analyzing the question of the potential and actual value orientations of the individual, different social groups and society as a whole with respect to the solid human being, about the evolution of this system of values, about its character in the framework of contemporary culture and near future. In this connection there is a need for analysis of various models of somatic (physical) culture. Each model is characterized by that the value of the body (or vice versa, a set of values) that serves as a reference for social entity (individual, social group, society as a whole), defines its relationship to the body, his behavior and even style (image) of life. Particularly relevant is the question of the somatic culture models that are most adequate to the realities of modern society and new socio-cultural conditions of the XXI century" [6].

Returning to the theme of the whole man, so important for the development of culture, it is need to note that sport can act as an indicator of the authenticity of a highly successful man himself. For through sports activity analysis can explore the boundaries beyond which a person loses the characteristics of the supplies of Homo sapiens species. This is especially true in connection with the above-noted expansion of the artificial and the prospect of creating

original cybernetic organisms, synthesizing elements of biological and artificial in the body of the man himself.

Being a kind of extreme human activity sport as a social and cultural phenomenon allows putting the question of the inadmissibility of the impact of artificial in the biological characteristics of the person. This problem is solved in the plane of the debate around the use of performance-enhancing drugs as an artificial stimulation of athlete activity in order to achieve some super results. "A humane essence of the sport that it was born and exists as a unique way of identifying the maximum, impartial harmonizing on an objective basis and a permanent incentive greatest development of certain human abilities, toward achievement of the individual features. In the field of sports, especially in the sphere of sports, are found, and are constantly being updated all the new tools and methods of activity abilities education. They are then transferred to the mass practice" [6, 48].

Thus, the philosophical formulation of the problem of sport on the one hand allows you to fix the issue of limiting the scope of the invasion of artificial human nature itself, on the other — to outline the prospect of harmonious development, which should be implemented in such a way that the person did not lose their original morphological characters. At the same time philosophical interpretation of the phenomenon of sport can achieve a more adequate understanding of its role in the formation of the ideal of new man — man of the XXI century. How would he be? Which values he would be committed to? Finally, as an ideal can be versatile and have a universal significance? The need for last the more relevant in the context of globalization and the interaction of different cultures today's interdependent world.

Thus, the emergence of a separate humanitarian discipline called "philosophy of sport" due to the rather intense intellectual movement that took place in North America at the turn of the sixties and seventies of the XIX century, the essence of which is the rehabilitation of the human in relation to abstract and metaphysical. As pointed out by one of the prominent contemporary researchers of the genesis of the philosophy of sport, the American scientist, an expert in sports psychology W. Morgan "... a decisive role in opening the academic philosophy of the sport played by two events. The first was the emergence of sport studies of old and current physical education. If the traditional physical education based solely on the medical and pedagogical studies of physical activity and sport, a new, emerging field of sports research pursued more ambitious intellectual goals, complementing traditional medical and pedagogical studies philosophical, historical and sociological. It ousting science and pedagogy as the main areas of work made it possible to study the cultural and historical contexts of sport. In this respect, the publication of "Movement and meaning" (1968) and Eleanor Metheny "People, Sport and existence" (1967) Howard Slusher staked out the place of sport philosophy in this new promising area of research" [7].

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## Section 17. Economics and management

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### Tourism in Uzbekistan: opportunities and new challenges

**Abstract:** Tourism is one of the fast growing and high income-generating industries in the world, which contributes to strengthening of international socio-economic, cultural and spiritual relationships. Uzbekistan pays considerable attention to the development of tourism as one of the leading countries in the world, having rich cultural and historical potential. However, study and analysis of this issue raised a wide layer of problems, related to the development of tourism. This article describes priorities for further development of tourism in Uzbekistan.

**Keywords:** Tourism, cultural and historical potential, international travel destinations, UNWTO, increase in the number of tourists, tourist products, investments, the State Committee of the Republic of Uzbekistan on the development of tourism, advertising campaigns, tourism information centers, hotels, ecotourism.

Various ways of development of alternative economic spheres and their constituents are increasingly becoming the targets of stormy debates in the socio-economic circles. One such alternative is tourism, which with the right approach to its development should become another locomotive for infrastructural development of the economy. Today tourism is dynamic and global sphere in the world economy.

In economically developed countries, tourism is the main source of currency earnings and one of the main accesses to the world stage, which increases the level of economic development of the country and well-being of citizens.

At present, world tourism feels revival, and currently the global tourism revenues have increased by 4.5% and this is a good prerequisite for the tourism industry to prepare our country for more intensive development.

According to data, provided in the latest issue of the UNWTO World Tourism Barometer, in 2015, the number of international tourist arrivals increased by 4.4% and totaled 1 184 million people (The UNWTO World Tourism Barometer URL: <http://mkt.unwto.org/barometer>) [1], while this figure amounted to 1 138 million people in 2014. This suggests that, in 2015 approximately 50 million more tourists (overnight travelers) traveled in travel destinations around the world.

In 2015, international tourism reached new heights. Efficient operations of the sector contributes to economic development and job creation in many parts of the world. Therefore, it is essential that countries have encouraged policies that promote sustained growth of tourism, including travel facilitation, human resource development and sustainability.

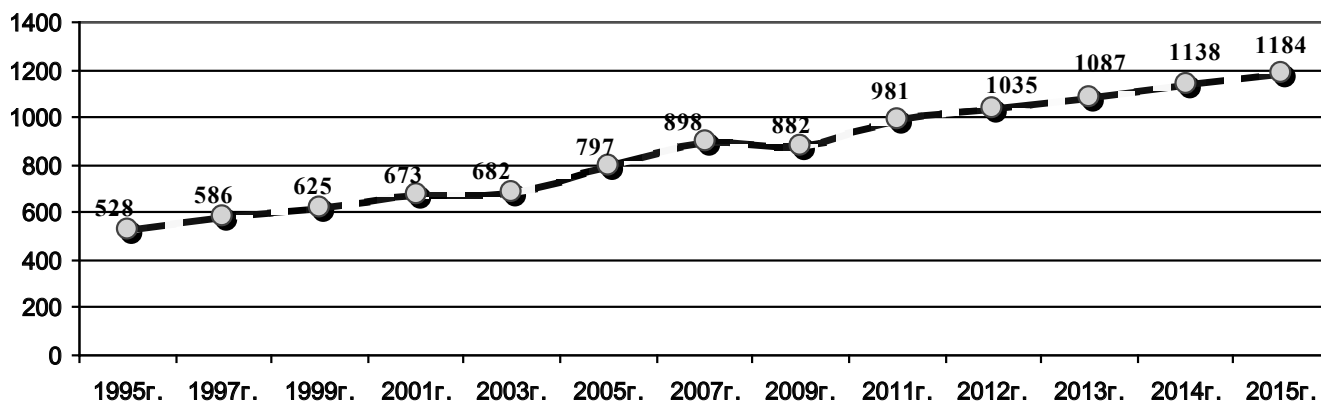


Figure 1. Dynamics of the tourist arrivals in the world during the period of 1995–2015 (million people)

Tourism is one of the fast growing and high income-generating industries in the world, which contributes to the strengthening of international socio-economic, cultural and spiritual relationships.

In recent years, tourism turns into major export industry of the world economy, the share of global GDP of which amounts to an average of 11%. For the past 40 years, the number of tourists who went to other States has increased almost 20 times, and income from tour-

ism-60 times, revenues from international tourism account for more than 400 billion dollars. The tourism industry employs 192 million people that is 8% of the population in the world. International tourism contributes to diversification of the economy, creating industries, serving tourism ("Development of tourism in Uzbekistan: problems, international cooperation, perspectives", Scientific project "Evolution of national statehood of Uzbekistan", [www.uzsthood.uz](http://www.uzsthood.uz)) [2].



According to experts, the major factors, influencing annual growth in the number of tourists, is the development of transport, communications, growing mobility, urbanization, reduction of working time, as well as increase of social wealth.

Leaders of the world tourism industry have prepared the hottest destinations for tourists for 2017 for publication of the "Financial Times". Uzbekistan is in the second place after Nepal in this list ("Where to go in 2017?" Financial times, December 27, 2016, www.ft.com) [3].

According to the newspaper, Uzbekistan is the ideal place for those who cannot afford long travels around the Silk Road. The country provides opportunity to familiarize with all the charms of such travel, including mosques, mausoleums, mosaic and minarets of the in the ancient cities of Samarkand, Bukhara and Khiva.

As one of the most ancient centers of world civilization, Uzbekistan has the greatest tourist potential in the region. More than 7000 historical and architectural sites, carefully saved invaluable spiritual heritage, ancient cities-Samarkand, Bukhara, Khiva, Shakhrisabz, included in the UNESCO world heritage list, annually attract about two million foreign guests from 70 countries of the world in our country.

Since gaining independence, fundamentally new principles of State policy in the sphere of tourism have been developed in the Republic.

Important step in this direction was establishment of the national company "Uzbektourism" according to the Decree of the Presidential of the Republic of Uzbekistan in 1992, which was responsible for formation of a national model for tourism development. The newly created company was entrusted with tasks such as coordinating tourist organizations, training in this area, stimulating development of all kinds of tourism, encouraging investment in the creation of material and technical base and industry infrastructure, etc.

With the aim of creating a modern, highly effective and competitive tourist complex in the country, during the years of independence, a solid regulatory framework was formed in the Republic, based on the law of the Republic of Uzbekistan "On tourism", adopted in August 20, 1999.

Main directions of the programmes are infrastructure development, including attracting investments, diversification of tourism

products, intensification of activities to attract foreign visitors, improvement of infrastructure facilities for foreign visitors, training and proficiency enhancement of the professionals.

Significant milestone in the annals of domestic tourism was the entry of Uzbekistan in the UN World Tourism Organization (UN-WTO) in 1993. For many years, Uzbekistan has been a member of the Executive Board of this authoritative international organization. Today it consists of above 150 countries.

Uzbekistan has great potential in this area, has great opportunities because of the number and variety of tourism resources, compared to other countries: including convenient node location in the transport-geographic area, unique geography and natural attractions, there are 37 caves on the territory of the Republic. Bioclimatic conditions allow tourists to be engaged actively in wellness and sports tourism, especially in winter. Historical and cultural heritage of Uzbekistan, which reflects long history of the region, associated primarily with the history of the Great Silk Road (Fergana Valley-Tashkent-Samarkand-Bukhara-Urgench-Khiva) is one of the main factors of the country attractiveness.

Uzbekistan is ranked ninth in the world by number of historical and architectural monuments. The above gives reason to conclude that Uzbekistan has great potential for development of tourism

At the same time, the results of the analysis show that appropriate attention and necessary support are not rendered, especially financial, for development of tourism infrastructure; overcoming institutional, managerial and human resource problems in the industry was a formality. The situation in the case pointed to absence of inter-agency coordination in this area at the appropriate level.

Not coherent policy in this area also negatively reflected in hospitality management, to one extent or another.

Experts estimate that revenues from international tourism in Uzbekistan in recent years accounted for no more than 10% of the potential. Despite having potential, income from tourism in Uzbekistan does not exceed 2 per cent of GDP, whereas in other countries (Spain, the United States, France, Egypt, Malaysia, the U.A.E.) tourism revenues range from 10 to 45% of GDP. Such contrast in earning capacity in tourist industry raises questions about causes and makes find solution to this problem. (Table 1).

Table 1. – Comparative analysis of selected indicators of the world by the tourism industry (million people); (Based on the official of materials prepared by the author)

Name of country	The share of tourism in GDP	Number of attendance in 2015	Responsible state agency
France	7%	84,5	Tourism Development Agency
USA	3%	80	absent
Malaysia	14,9%	25,7	Ministry of tourism
Turkey	4,5%	36,24	Ministry of tourism
India	6%	8	Ministry of tourism
Uzbekistan	1,8%	2	The State Committee of the Republic of Uzbekistan on the development of tourism

Despite some growth in the country in this area, which started from a low level, this potential has to be translated into reality yet; therewith, many problems constrain significant growth in the tourism sector that prevent the country from achieving great international success in this sphere, such as lack of financial resources; outdated regulatory framework; not well-developed infrastructure; monotonous tour product and low diversification; barriers to obtaining entry visa by foreigners etc.

Accordingly, in order to create favorable economic and legal conditions for intensive development of tourism as a strategic sector

of the economy of Uzbekistan, the most complete and effective use of the vast tourism potential of regions, radical improvement of the tourism industry management, creation of national tourist product and its promotion to world markets, formation of positive image of Uzbekistan in the sphere of tourism, as well as for sustainable and balanced development of tourism activity, creating necessary material and technical base, security of life and health of foreign tourists and citizens of the Republic, development of equitable economic cooperation with foreign countries Decrees of the President of the Republic of Uzbekistan from 02.12.2016 №DP-4861 and

from 22.12.2016 №DP-4895 gave new impulse to development of tourism in the country.

In particular, the Decrees of the President adopted the following changes and innovation in the tourism sector of Uzbekistan:

a) targets and priorities of State policy in sphere of tourism in the medium term perspective are identified;

b) the State Committee of the Republic of Uzbekistan on the development of tourism was established on the basis of abrogated national company “Uzbektourism”;

c) the Government of the Republic of Uzbekistan is entrusted with development of the concept of tourist industry development in the Republic of Uzbekistan for the medium term perspective as well as programme of specific measures to implement the concept in 2017–2021;

d) changes are made in licensing procedure for the right of realization of tourist activities and certification of tourist services;

e) Since January 1, 2021, visa regime will be cancelled for citizens of 15 leading countries in Europe, America and Asia, arriving to the Republic of Uzbekistan with tourist purposes for the period not exceeding 30 days, as well as for the citizens of 12 countries, 55 years of age, and entering the Republic of Uzbekistan in tourist purposes for the period not exceeding 30 days, etc.

Experience of tourism management in developed countries (the United States, France, the United Kingdom, Austria, and Spain) shows high efficiency of tourism industry development with clear definition of the functions of Government in this area.

Study of international experience shows that, in countries with a developed tourism industry, such as France, Turkey, Greece, Egypt, Japan, functions of public administration, tourism industry and control functions of business are distinguished clearly in public administration of tourism. That is why creation of the public body—the State Committee of Republic of Uzbekistan on the development of tourism is the most important step towards further development of tourism.

At the next stage of development, activities, related to creation of new opportunities, as well as cardinal revision of existing systems in the tourism industry, in our view, should include the following:

1. Tourist rating is associated directly with attracting investments in this industry. The development of tourism in the country could increase investments, flow of currency through increase in exports of services, create jobs, improve the level of service. In our view, the State Committee for tourism development at this stage of development should pay attention to the development and monitoring of the implementation of national and regional programmes for integrated tourism development, accelerated development of the wide range of tourism, attracting foreign investments, and also loans and grants from international financial institutions and other organizations in the development of tourist infrastructure.

When designing the Programme of concrete measures for implementation of the concept of tourism development in Uzbekistan in 2017–2021 by the Government, it is advisable to foresee extensive use of the newly established extra-budgetary fund to support the tourism sphere under the Committee.

2. Active study of underutilized opportunities but with a solid foundation for the wide dissemination in Uzbekistan of the types of tourism such as medical tourism, rural tourism, pilgrimage and religious tourism, eco-tourism, gastronomy and wine tourism, tourism for pensioners should be the main goal of the ongoing scientific studies on the development of tourism in Uzbekistan.

3. Funds, allocated by extra-budgetary fund, and attracted investments should be used for all sorts of tourist publicity

campaigns, for maintenance of tourism information centers, improvement of infrastructures of historical heritages and ski resorts, investing in airlines or corporate development of tourism in Uzbekistan.

4. Another important area, requiring special attention in the development of tourism in Uzbekistan, is the ICT industry. Today we cannot imagine any sphere of activity without modern technology. In terms of informatization and computerization, development of tourist activities in Uzbekistan requires new approach to information processing.

In order to ensure efficient operation of any modern tourist enterprises it is necessary to implement modern ICT and software. Process of ICT development and modernization in tourism improves quality of tourism services, which leads to increase in the number of foreign tourists and promotes great awareness of the tourist potential of the country.

Today more than dozen programs of travel agencies automation are presented at the tourist market of Uzbekistan (“1 C–Canvas: travel agency”, “InTourOffice”, “Master-tour”, “SAMO-tour”, etc.). Speaking about ICT use in tourism, we cannot fail mentioning reservation systems in hotels and transport. Almost all Uzbekistan Hotels use them. However, there is no unified system in the Republic (ICT as a factor in the development of tourism in Uzbekistan, magazine “infoCOM.UZ”, November, 19, 2016) [5].

Therefore, it should be noted that, thanks to the skilful attraction of standard and software, many processes in tourism have already been modified; information technology and electronic data interchange have been implemented in them. A survey of tourists, arrived in Uzbekistan, showed that many of them learned about the country and decided to visit it, to book hotel reservations based on data from the Internet.

Currently, a great deal has been accomplished, but much more remains to be done to bring the tourism industry on a more promising development level based on strong expertise and knowledge on the effective use of information and communication technologies. In this context, establishment of Republican tourist portal, bringing together all tourist organizations into a single virtual information space based on the State Committee for tourism development, is actual.

5. Tourism infrastructure in Uzbekistan also requires comprehensive improvement and raising up to international standards. Tourist package is formed from the basic, additional and related travel services. In this case, experience of forming tourist packages shows certain shortcomings.

In this connection, it is necessary to focus on the international component of tourism, to develop a set of measures for compliance of tourist infrastructure with all international requirements in the field of tourism. It is advisable to take an inventory of objects of tourism infrastructure and develop a division into categories based on level of service in line with international standards.

6. Development of inner tourism. Stimulation of domestic tourism, activity of tour operators, working in the field of domestic tourism, as well as development and implementation of tourist and excursion activities in the education system.

7. When working out strategy of tourism development, it is necessary to take into account the most important features of Uzbekistan with special emphasis on the development of a large number of related tourism services. Within tourism diversification it is necessary to carry out work, aimed at the development of such services as sports (sailing, golf, mountaineering etc.), wellness (thermal water, surgery, physiotherapy, etc.), revival of national values and

national applied art, etc. To use positive experience of developed tourism countries (Turkey, Algeria, Egypt) in composing and wide dissemination of mythical stories and interesting stories, related to places of pilgrimage

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## Development perspectives of ecological management in Uzbekistan

**Abstract:** Ecological management is to make use of nature in socio-economic affairs and make a good science-based choice in environmental protection regulations, and especially, it comprises the management of ecological socio-economic affairs. From this point of view, it is closely related to production and, therefore, has a part in all phases of the process of socio-economic repeated production. Moreover, it is considered ecological and ecologic-anthropogenic system. Here, the regulations of ecological and economic affairs are directed towards the preserving the objects of nature (ecosystems), improving, restoring and making an effective use of them. Furthermore, it aims at preserving the environment for future as well as current generations. Examining the mutual effects of ecological management with local, national and international problems serves as the scientific object of our article.

**Keywords:** ecological and economic environment, ecological management, ecological safety, ecological right, biological diversity, ecological regression, national economy, flora and fauna, ecological markets.

#### Introduction

Modernization of economy and making structural changes based on reforms requires utilizing the country's natural and economic possibilities prudently as well as the consideration and regulation of the environment. During the Independence years in Uzbekistan some measures were taken on this issues, which became an inseparable integral part of reforming national economy. Paying attention to this process, the first President of our country Islom Karimov stated: "... fundamental changes to approaches and principles of management system made a major contribution in disposing of conservative views and in supplying for its obtaining a real marketing features" [1].

In this process relying on management, making use of principles of it is one of the essential categories for the branches of economy. Management teaches the secret of leadership skill and the art of leadership, the secrets of economic running household, means and methods, managing principles employed in increasing the effectiveness of a company, forms of effective work. In our republic carrying out effective economic reforms creates a need for closely approaching to preparation of flexible modern managers who are eager for news.

Basing the methods of decreasing the ecological danger to minimum, economizing the resources, improving the ecological safety of the production and consumption processes, ecological management allows to carry out the following: a) determining the expenses

of companies, firms, small business, businessmen' companies and occupying new ecological markets, increasing the competitiveness; b) raising the quality of the protection of environment and nature taking into account the benefit of the current and future generations; c) preserving the biological diversity in nature and protecting the natural resources".

#### Analysis of literature

The matters of economic evaluation and of making an effective use of natural resources, some aspects of providing the socio-economic development by sticking to the principles of ecological management were approached by contemporary authors like Abalkin, L., Averchinkov, A., Aganbagyan, A., Agapov, N., Akhimova, T., Anisimov, A., Babayeva, E., Balaski, O., Boboshko, V., Bobilev, S., Borgayakov, S., Bocharov, V., Vernadski, V., Voronsov, A., Vivares, A., Glasbrenner, G., Golub, A., Danilov, V., Lukyanchikov, N [2]. Uzbek scientists like Eshmukhamedov, A., Sakharov, G., Abduganiyev, A., Salimov, B., Murodov, Ch., Choriyev, K., Kodirov, A., Khakimov, R., Otakulov M., Yusupov, M [3].

The rise of attention to the international cooperation in the protection of nature, renewable and non-renewable resources, in the contamination of nature whilst using of land, water, climate. Mineral and biological resources (flora and fauna) and also in the occupying the natural resources by human. Because, nature supplies the society with raw materials, energy and aesthetic wealth, and also informs with the principles of development, construction and formation.

The integral parts of substances and organisms continue to be a component of biosphere. The more appropriate are the actions of human with the laws of nature, the more beneficial and successful are these actions in both society and economy. The more unsuitable they are towards nature, the less benefit for the society and as a result the risk of ecological regression is increased. Society and economy follows the main principles of the development of nature.

For the past few years more attention has been paid to the process of evaluation and regulation of using the natural resources as well as the protection of environment in the Republic of Uzbekistan. Should ecology is regarded as having a real material nature due to its economic activities, the regulations of ecological affairs remains the main problematic issues. Hence, ecological management is defined as coordinating means of the purpose of subjects, and as a system of supplying economic development, improving the economic affairs between products, the service officers and consumers. Ecol-

ogy is one of the serious problems of the current world. Solving this problem serves for the sake of people, the future of civilization is dependent on this matter. But, we should not take ecological management as the regulation of environment and nature. Environment and nature are water, land, air, plants, animals, birds and likewise, in which human lives, breathes, obtains and uses the necessities from it. If we suggest that human can control the processes and events happening in environment, we make a crucial mistake. Because, human can't always afford influence the matters connected to nature and therefore.

The method of ecological is based on the dependence of every type of regulations of the use of nature on the forcing the laws of nature. To carry out the regulations of the socio-economic affairs successfully, it should obey the laws of nature. Because human cannot change the course of natural processes happening in the real environment.

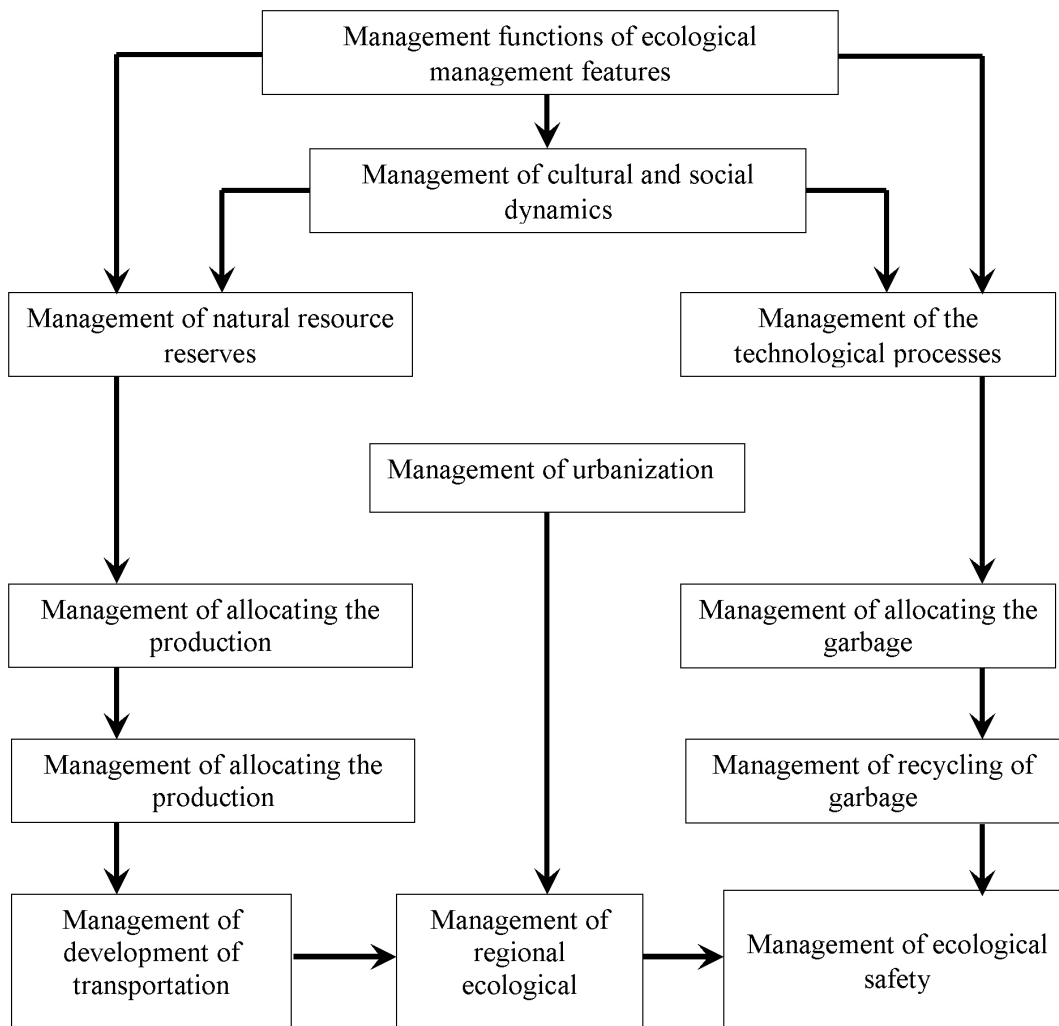


Figure 1. Management functions of ecology

Ecological management is regarded as the controlling of the modern production processes, which provides the protection and the use of natural resources prudently. Ecological management is a relatively new notion in our country, which came into form recently. The principles of ecological the social field and economic field branches have been worked out in the economic policy of most countries [4]. The objective conditions of the development of ecological management is closely connected to the household activity, which is an important factor of changing and affecting the environment. The consideration of the effect of environmental factor on the

development of economy is of great importance. Hence, encouraging the socio-economic development without considering the ecological factors, the regulations arranging the relations between the society and nature may cause economical and social consequences.

In the third part of our article the issues related to the changes in ecological management process in the usage of natural resources are dealt with. In this part the management of usage of natural resources and ecology in the gradual development of national economy, the development and formation of ecological management in the usage of natural resources, changes in the developing and providing

processes of restoring and preserving of land resources, the use of water resources and setting up the ecological management in the improving it thoroughly, the preservation and protection of flora in providing the natural bio-diversity, repeated production and the conclusion on theoretical and applied matters like defining the methodical bases of evaluation of effectiveness of running the use of repeated production is based on particular perspectives.

Among the good results achieved in the economic development in our country are GDP that rose by 8%, the volume of production of industry materials rose by 8,8%, agriculture 6,8%, the circulation of retailing soar up by 14,8%.

Nowadays, some problems are emerging in different companies due to the new economic mechanism reinforcements. The main purpose in setting these mechanisms is not only getting financial profit, but also finding out ways of producing quality products. As world and our countries experiences show, stable economic development is not reached by polluting the nature and exhausting natural resources and at the same time maintaining the quality of nature is not achieved without strong economy. Hence, in the ecological economy two things are demanded: a) effective use of natural ecological conditions and resources in economy; b) setting up measures and methods preventing the contamination and decline of environment under the influence of economy [5]. These problems are to be solved taking into consideration the formation of new value systems and society's changing need in the base of principles of historical and natural character.

Development of national economy should be based on this idea. High degree of repeated production in a long period of time, economical development, public abundance improvement,

protecting and natural environment will be done in stable development of national economy and in this providing current generations needs does not leave under the risk of providing future generations needs. To solve this problem involves to improve ecological and economic attitudes between society and nature. They include doing the following mechanisms:

1. To improve the usage of nature of government and society and the role of protection of governing
2. To develop the expertise of government and society and in this complex consideration of ecological and economic results
3. To develop and widely operate the mechanisms of ecological and economic order
4. To develop and improve the ecological and economic education and upbringing

**Data Analysis**

Land is the priceless wealth of human. Land provides human with food along with plant life, clothing, construction material and so on. Therefore, protecting the sacred land is everyone's duty. The area of the republic of Uzbekistan is 447,4 thousand km<sup>2</sup>. Lands used in agriculture are 28081 thousand ha, cultivated lands are over 4,2 mln ha, forest lands are 1,3 mln ha, unused state lands are 15309,9 thousand ha. The lands used in countryside is of great percentage (picture 2). As shown in the picture, lands used in agriculture are 63,31% as of January 1, 2015. Cultivated lands in the dry climate conditions peculiar to Uzbekistan is of importance. These lands takes 21% of the republic's lands, which produces 95% products in plant-growing.

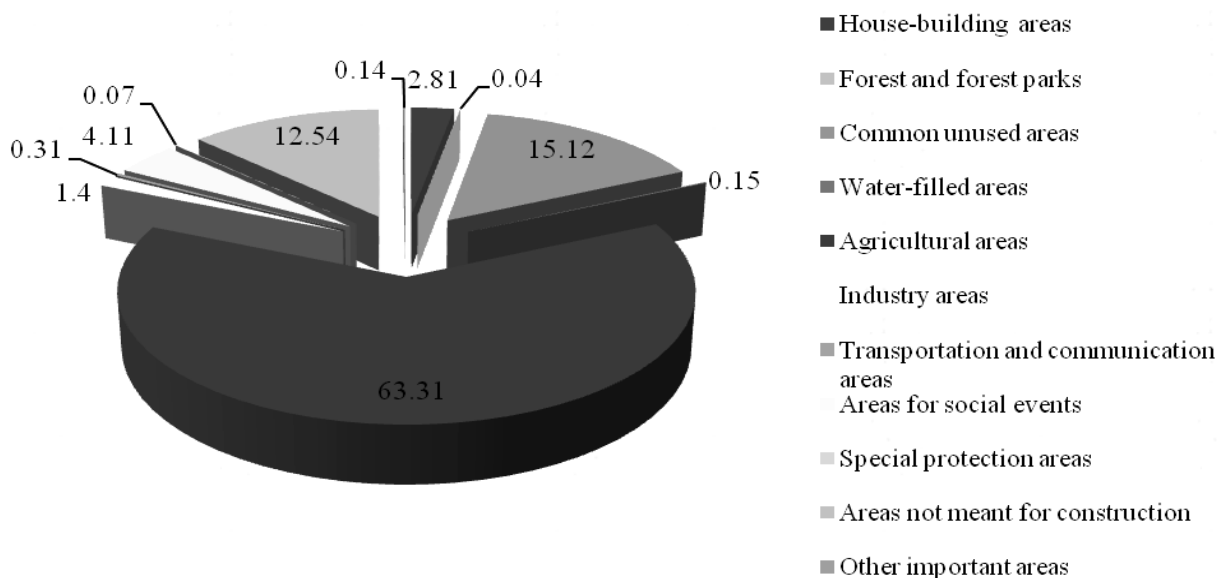


Figure 2. Land contents belonging to rural areas in Uzbekistan, % (2015)

Land resources that can be cultivated are 7 million ha. As well as, there are pasture red-soils (16%), pastures (44%), red-soils (30%) and arid-pastures (10%). From 1970 to 1985 years cultivated lands expanded substantially. In this period cultivated land in the republic expanded by from 2,8 to 4 million ha or 43%. On the one hand, occupying the lands led to the using water resources which is reflected on Aral Sea areas, on the other hand it helped economy deal with demographic issues easily and eased the other issues.

In the article the issues of use of water prudently and its being a factor for social and economic wellbeing and for ecological balance and the importance of this issue is mentioned. Water is a source of life and plays a basic role in people's civilization development and

well-being. But in the second part of 20 s century the unelaborate plan and activities lead to Aral sea to dry and the decrease of waters of Amudarya and Syrdarya. Negative affects of ecological disaster of the areas around Aral Sea is having and effect on the countries of Central Asia. Water not only affects the geo-economic and geo-political development of each country, but also provides the national and food safety to those countries [6]. The supplying of the legislation of laws and legal bases concerning the duties of consumers of water is becoming an important issue.

On the 7<sup>th</sup> congress of the democratic-liberal party of the republic of Uzbekistan the first president of the republic pointed out in his speech: "In our limited condition of land and water resources

the continuation of irrigation and melioration, optimization of the content of the lands, introducing new sophisticated agro technolo-

gies are the crucial issues of reforming the agriculture and they have always been in our spotlight and it will continue”.

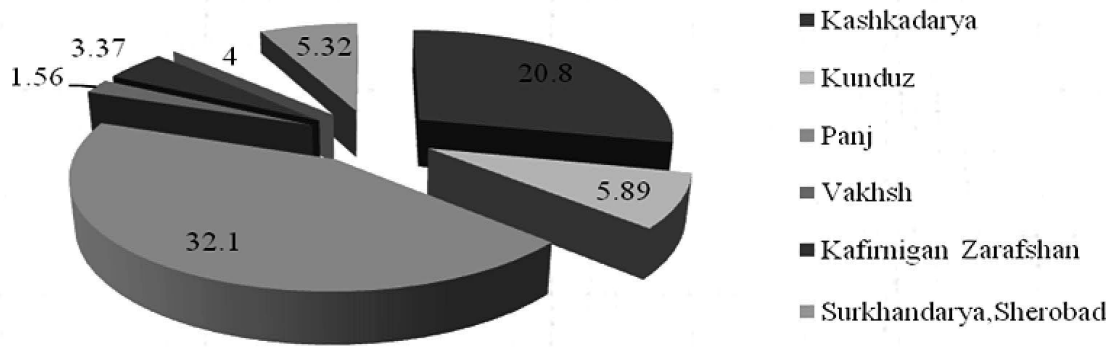


Figure 3. Long-period of time description of water resources

An effective use of water resources and the works done on this sphere, the developing the legal documents concerning the use of water, the improving of the quality of water resources and the economizing the consuming, the use of water resources on borders, and other measures taken on these spheres are giving its results.

Poisoned water is worthless for drinking and it causes developing of illnesses in large numbers. For that reason, rational using of water, keeping its purity and protecting are one of the actual issues. According to scientists dates, our republic yearly water resource is equal to 99,5 km<sup>3</sup>, only 12,2 of which appears on this region.

Thus, protection of water resources should be carried out in two ways. Firstly, preventing the decrease in terms of volume, secondly preventing its pollution and exceeding the degree of mineralization.

According to points said above, we recommend some methods of using the resources prudently:

- Carrying out legal land-water reforms;
- Damped, salty lands, holding the irrigation and meliorative events;
- Reinforcing the sophisticated and new technologies for production;
- Using of chemical means without affecting ecology;
- Carrying out selection, agro technical events;

- Perfecting and consolidating the treatment between land water.

In the article, the atmosphere of business in the ecological management of usage of natural resource, the implementation of managing secondary resources and fulfilling the tasks related to keeping natural biodiversity, discretion which has significant role to play in the environment of business in using natural resources and the role utilization management in implementation were deeply analyzed. Along with the rise of the capitals of the population, their contents also changed, profit taken from business is increasing. In 2014, this figure rose to 53,4%. Another significant point of this issue that fast improvement of particular feature of demographic state in our country is the number of youth who have the capacity for work. From this point, providing with work for extra labor, solving the issue of employment are the main socio-economic problems in our country. The best effective ways of solving this problem is to increase the number of small companies, to support private enterprises. Apart from it, 60% of the country’s population live in rural areas. Nowadays supplying with jobs to people in rural areas, providing income resources is especially actual problem [7]. This problem is connected to the scarce state of water and land resources.

Table 1. – Capitals spent on the ecological events from the state budget in 2012–2015

Environmental protection events	2012	2013	2014	2015
Protection of atmosphere (creating sanitary protection zones)	18,2	20,0	20,0	21,4
Water and land resources protection	17,4	18,0	18,6	18,8
Construction and repairing of running-water cleaning buildings	28,4	30,5	53,3	127,2
Flora and fauna protection	5,2	5,5	7,1	7,1
Forest planting	20,7	21,5	24,8	24,8
Preserving the biodiversity	5,2	5,4	7,3	7,3
Construction and repairing of natural zones under protection	17,2	18,4	26,1	26,3
Ecological events being held around Aral Sea	3,4	1,2	1,4	1,2
Improving the meliorative condition of lands	264,2	343,4	455	462,6
Keeping the land from water and wind erosions	1,3	1,3	1,7	1,8
Land recultivation	2,1	1,6	1,7	1,8
Utilization and rendering harmless of collection of waste	114,1	114,1	118,5	118,9
The legislation of the protection program of environment in Uzbekistan in 2011–2015	5,4	5,4	5,8	6,1
Other events concerning the protection of environment	1,6	1,6	1,7	16

Moreover, the work includes an experience that is based on exact facts about saving and restoring a group of natural flora and unity of environment that they grow, types of plants growing in wild and their genetic reserve as components of biological variety.

Taking into consideration its national concerns, Uzbekistan joined two conventions about wild flora and fauna that are under the danger of extinct and about water-march that has international value because it is a living place for most birds that swim in water.

**Conclusion**

To sum up, for the past few years a great deal of attention has been paid to the processes of evaluation and regulations of the using of natural resources, as well as protection of environment in Uzbekistan. If ecology, as a source of providing the need of organisms and the daily life of people, is considered having its material importance for its economic activity, the controlling of economic affairs under the neutral economic demands is one of the actual problems standing in the way of countries. We can demonstrate the dynamics of the expenses spent for a few years on

events related to the protection of environment with the help of observing method used in our research.

In 2014 state budget expenses on protection of environment was 48,9 billion sum, of which 31,3 billion sum spent on protection of landscape and the biological diversity, 4,2 billion sum on cleaning and disposing of wastes, 5,2 billion sum on cleaning and disposing running-water, 8,2 billion sum was spent on the issues related to the protection of environment.

To conclude, we should bear in mind that although there is no limit to the need of people, the water and land resources are limited.

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## Methodological features of evaluation of competitive advantages of a commercial bank

**Abstract:** The article describes the development of theoretical issues of formation and development of competitive advantages of a commercial bank. The thesis says that competitive advantage of a bank primary depends on competitiveness of the banking products and services.

**Keywords:** competition, commercial Bank, competitive advantage.

The increase of commercial bank's profit directly depends on competitiveness of the banking product, as well as a bank itself. The competitiveness of the banking products and services is estimated by the quality of offered services and conformity to the requirements of clients.

The principal element of competition in any market is product, by means of which the client meets his needs and bank receives required profit. Therefore, exactly competitiveness of banking product and service, not of individual commercial bank, is basic notion of competition.

Today the term “competitiveness of product or service” does not have clear and generally accepted definition. The view of the majority is that “competitiveness of product or service” is a set of qualitative and economic characteristics of banking products [2].

The main concept of banking competition is most clearly expressed in the most important characteristic of banking services in the market — in its competitiveness, i. e. in the bank's ability to meet customer needs. At the moment, commercial banks are focused on development of new or upgrading of existing banking products and

services in strategy of development. Banks treat it as fundamental tool for ensuring the stability of its operation, economic growth, competitiveness and achieve financial stability, as the effectiveness of the bank's activities depends on its ability to meet the specific needs of customers.

The superiority of a banking product over the banking products of competitors is expressed through sales figure for this service on the market under investigation. Competitiveness of service is reflected in its ability to compete with other services, and to win the maximum number of customers to whom it is aimed, with the help of an interconnected set of conditions, limitations and risks, which are its constituent conditions in the specified time.

Growing competition forces banks to be very careful about the competitive advantages of the services that are valued by consumers and which can not be ignored. Each bank at given point in time has its own set of banking services, which are at certain stages of the life cycle, owing to external and internal factors, can lead either to an increase in sales volume and profitability of services or to reduce the demand for services of the bank, reduce their profitability and even of losses.

The quality of banking product and service can be defined as the totality of features and characteristics of the product, which gives to the bank ability to meet conditional and anticipated needs of customers. The quality of banking services depends significantly on the comparison process by customer of expectations of its quality prior to its consumption with the perception of the quality of banking services during and after its consumption. The perception of the quality of banking services takes place in two main aspects: what exactly client receives from the banking service and how client receives the banking service.

The differentiation of the quality of services, as well as the general orientation to improve the quality of customer service, raises to banks the problem of defining criteria of quality banking products. In principle, there are two possible approaches: from the perspective of customers and in terms of the banks.

The approach from the perspective of customers to the quality of banking products highlights the problem of maintenance. Here, the most important are: the speed of service, promptness of operations, working hours of a bank, errors and inaccuracies in the work, the quality of counseling. The client compares the quality of banking services with their prices and other banks-competitors.

With regards to the bank approach, quality criteria are as follows: the speed of the internal work processes, the level of costs for the correction of errors, the productivity of bank staff, bank employees' mo-

tivation and other factors that are compared with the level of costs for the production of banking services. It is obvious, that in management two groups of quality criteria should be taken into account [1].

Quality work with clients requires that bank staff not only great in economic preparation, but also good knowledge of the basics of human psychology, business ethics, the ability to negotiate. In many cases, it is difficult or almost impossible for customer to assess major measurer of the quality of services, which is banker's qualification. Therefore, it is very significant the importance of the environment and the availability of additional services: personal attention, courtesy, responsiveness of staff, communication in the language of the client, the ability to listen, to give advice on matters of interest to the client, and others.

In order to achieve competitive advantages, commercial bank is required to invest directly in customer acquisition and promotion of its services in the market. Herewith, success depends on how the bank will be able to find their competitive advantages, including its individuality and clientele, will be able to adapt to customer needs and create new demand for banking services and products.

The following table presents the peculiarities of banking services and customer requirements, which should be considered in formation of the strategy of achieving competitive advantages of a commercial bank.

Table 1. – Features of banking services and customer requirements underlying the competitive advantage of a commercial bank

Nº	The characteristics of the services	Clients' requirements for services underlying the competitive advantages of a bank
1.	The abstractedness of services, is reflected in the inability to see and evaluate service before its receipt	The customer demands higher requirements to the bank staff, bank equipment, the design of premises, etc.
2.	Sources of providing services, which are bank staff or equipment.	The client is in direct contact with bank employees in process of receiving services. Only routine services that do not require human intervention are automated
3.	Inability to storage services	In order to provide a full servicing during peak periods, bank should engage staff from other departments
4.	Contractual character of providing services	The nature and content of the contract should be clarified to customer
5.	Any banking service is related to money	Customer should entrust his money to a commercial bank, and the bank should make an effort to strengthen this trust
6.	Spread of providing service	It is required to optimize customer relationships during their cooperation with the bank
7.	Recognition of the bank's service	Customer perception of the receipt of unique service, enhances the competitive advantages of the bank

*The table is developed by the author*

As table 1 shows, commercial banks, in implementing activity focused on customer needs, increase attention, on the one hand, to study of the banking market, on the other hand, to preservation of existing and attracting of new customers. Therefore it is required to analyze the organization and carrying out marketing planning, the implementation of which provides banks a competitive advantage, allowing to concentrate resources on priority groups of clients and effective directions of the activity, making it possible to respond more quickly to market changes, increasing market share, sales volume and profitability of the bank.

The solution for increasing competitiveness of banking products and services, expansion of bank's activity, finally for its own competitiveness is development of competitive strategy of growth, enabling to formation of competitive advantages of bank, as well as regulation of the competitive position in the banking market, considering the current changes in customer preferences.

In the modern context, competitive advantages of commercial bank are determined by the degree of its compliance with offered bank products and services to customers' needs and to strong growth

of its customer base. The growing competition in the banking market, exacerbated by the development of a network of pawnshops, makes bankers to link the future of their business with the development of its customers' business and their strategic goals and objectives. The bank should implement the most important thing for the customer.

Eventually, formation and development of competitive advantages of a commercial bank is determined by the value for the customer, which is created in four ways: improving the quality of banking products, competence and professionalism of bank staff, which are reflected in the quality of customer service, lower prices of banking services (which is beneficial for the client) and creating conditions for the development of the client's business. In other words, the bank's competitive advantage depends on what the customer actually receives in the form of value to him.

In our opinion, the aforementioned internal and external competences collectively define a complex of systemically important factors and conditions underlying the formation of competitive advantages of the commercial bank (Figure 1).



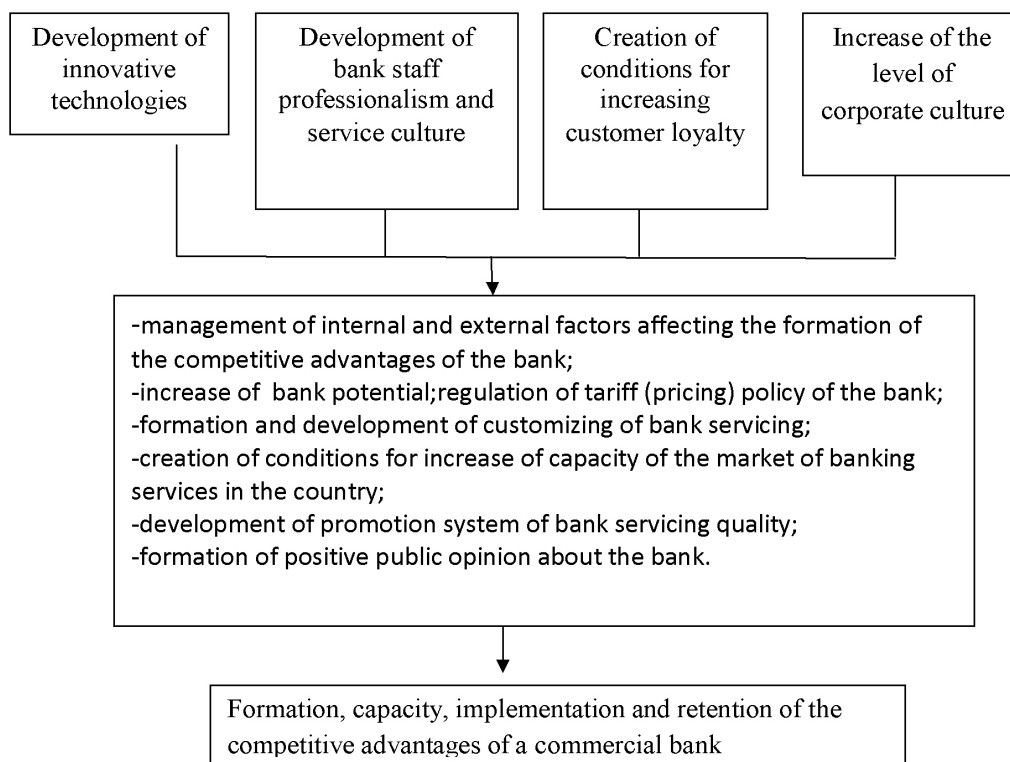


Figure 1. Systemically important factors and conditions underlying the formation of competitive advantages of a commercial bank

As can be seen from the figure, for the formation, implementation and retain of competitive advantage by commercial bank, it is required certain conditions. In our opinion, required conditions are as follows:

- based on an analysis of client needs and the latest developments in banking business, credit organization should permanently implement innovation;
- continuously develop and introduce new banking products and services;
- features of the bank due to the qualifications, initiative and professionalism of the staff, which requires continuous training of bank staff;
- bank should stand out by its dynamic capabilities of introduction of products and services, which are required by customer;

- adapt to the continuous changes in the business environment of its clients;
- bank should take care of the attractiveness of its brand, image and efficiency of business processes, organizational structure and other intangible assets, including the knowledge and professionalism of the bank staff.

**Conclusion:** Competitive advantages of a bank definitely should be reflected in product, price, quality of service, low costs and in other figures of activity of commercial bank, i. e. they should be measured and evaluated by economic indicators: higher profitability, greater market share, high volume of sales, large number of attracted customers, and others.

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