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## Section 1. Biology

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### Fungitoxic and growth-promoting properties of the complex copper component and glycyrrhizin acid

**Abstract:** It has been defined height stimulation and fungi toxic activity of the complex glycerin acid with a copper component. The complex created under local materials glycerin acid and a copper component. The stability mechanism of rust to disease of wheat on the formation of phenol compounds was studied. The development of the *Puccinia striiformis* f.sp.tritici from concentration of phenol compounds in wheat fabrics is shown dependence. It is defined that the formation of phenol compounds is increased under the influence of complex that it has a positive impact on stability of plants to rust.

**Keywords:** Wheat, a yellow rust, glycerin acid, copper component, phenol compounds.

For the last years in the region of Central Asia phytopathologic situations have aggravated in connection with epiphythotical distributions of a rust (yellow and brown), sheet spotty (helminthosporiosis, physiological and yellow spots) and others which puts considerable economic damages, reducing a crop and quality of grain of wheat.

The yellow rust is developed on wheat, both on irrigation, and on arid lands [1] and is observed frequent flashes with presence of natural sources of an infection [2]. The capacity of penetration of spore is more than wheat growing under irrigation conditions that the vegetative weight is developed, a mouth of leaf is found opened longer. The affection of wheat leads to decrease in assimilation activity, in intensification transpiration of breath and breach of other physiological and biological processes. There is a decrease in starch and protein synthesis in endosperm that reduces the quality and weight of grain [3–5]. It is observed the changes in balance of regulators of growth in fabrics of plants: indolacetic acid (IAA) [6] is accumulated, ethylene is intensively formed, the contents of **abszine** acid is increased. It results in loss of a crop and its quality.

The protection of plants is the important condition of the intensification of agriculture. Therefore, together with agrotechnical and selection methods for struggle against fungi diseases, various chemical preparations are widely used just against a yellow rust of wheat.

The application of chemotherapeutical substances has an object to protect plants from an infection not only in the present year, but also in the subsequent generations. Thanks to this resistance to a parasite is increased both in a year of application, and in the subsequent generations. Besides, growth and development of plants is stimulated and in consequence the crop is increased and the quality of production is improved [7].

Lately various chemical preparations have been widely applied in struggle for wheat rust.

Bayleton, baytan and others fungicides of triazole compounds possess some properties of cytokinin in cytokininesensitive tests [6] and also are characterized multiprotector impact on plants as the plants preprocessed by them, are less damaged under the influence of not only biotic, but also such abiotic stress factors, as high and low temperatures, a drought [8–12]. It is necessary to emphasis that all these fungicides

are effective against various kinds of fungies. But all of them are imported, therefore it is necessary to conduct work on creation from accessible raw materials of the domestic cheap, ecologically safe preparations, which are capable to enhance resistance of plants to fungi diseases.

In connection with this we worked out a stimulator (complex glycerin acid and a copper component) for the growth of plants, possessing fungitoxic on the basis of glycyrrhizin acid and copper component (GACC).

The objective of this inquire is to investigate antirust activity of this preparation and find out feasible mechanisms of active resistance of wheat to rusts, connected with phenolic metabolisms.

#### Materials and methods

We conducted an investigation on plants of winter soft wheat (*Triticum aestivum*) sorts of Sayhun, Bayaut 1, Sanzar 8, Chillaki and Yonbosh in laboratory and field conditions. Before sowing seeds of wheat we processed a solution of GACC. Sowing the samples of wheat on an infectious site pickled by preparation GACC and without it was in 1 m<sup>2</sup> 50–60 grains with row-spacing 20 sm. And we have planted special pots by 10 pieces in laboratory conditions pickled and control samples of grains of wheat.

We studied antifungal and growstimulation activity of the GACC preparation. We compared the antifungal activity of GACC with fungicides of bayleton and tilt. For this purpose, we sprayed the solution of GACC and fungicides of bayleton and tilt before and after artificial infections of a yellow rust.

Artificial infection with local populations of a yellow rust of adult plants on an infectious site in field conditions and sowed in special pots in laboratory conditions we spent in the period of vegetation of wheat. For inoculation plants we mixed spores with talc in the ratio 1:50 and sprayed mixture on plants. After that, we covered affected plants with polyethylene and put the into refrigerator within 5 days. As for field conditions affected plants were isolated from other wheat fields and watered 7–8 times to increase humidity of soil.

We made an accounting of affection in 14–18 days after infection. The degree of affection of samples was estimated on a percentage scale.

The definition of phenol compounds, both free and connected, in various parts of the specified plants was made on work

of Berner [13]. After gathering fresh material was directly divided into separate parts (leaves, an ear or an inflorescence, a stalk and roots). The divided material was frozen, exposed to liofil drying and was stored at temperatures till the analysis in such kind.

We filled 5–10 gr. the dry crushed material with water (1:10) and insisted at 26°C within 24 hours in toluol presence. And we filtered the received extract from a vegetative material, acidified till pH 3.0–3.5 and repeatedly extracted with ether. We dried up the connected ether extracts over calcinated  $\text{Na}_2\text{SO}_4$  and made them evaporate at low temperature dry. The rest after ether removal was dissolved in 1–2 ml. by 96%-s' ethyl spirits and subjected chromatographic to division into a paper.

In order to reveal stains on chromatograms we used solutions of dinitrogenecting sulfonil acids and n-nitroaniline, ethanol solution

floroglucyne and concentrated HCl, a solution 2N 2,4-dinitrofenilgidrazina.

### Results

At epiphithotical developments of a rust and septorios, agro-technical receptions are inefficient and there are huge losses of a crop. In connection with this, constant attention was paid to work out chemical receptions of protection of crops of wheat [14].

We studied growstimulation and fungitoxic properties of the preparation of GACC created by us in the whole period of vegetation of winter grades of wheat. It was observed that marked differences of impact of the preparation of GACC and fungicides of Bayleton and tilt on developments of a yellow rust and biological signs of wheat after inoculation with spores of a rust (Fig. 1 and Table 1).

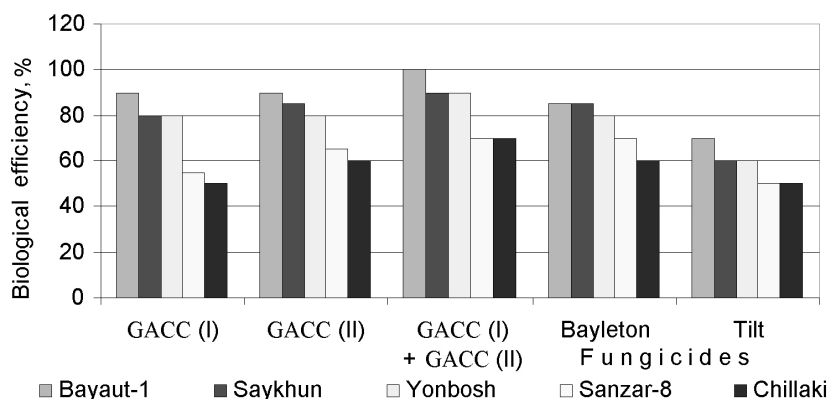


Fig. 1. Fungitoxic effects of fungicides of bayleton, tilt, and GACC

Table 1. – Influence of preparation GACC and fungicides of bayleton and tilt on biological signs of sorts of wheat

Sorts	Scheme of experience	Mass 1000 Grain	Crop grain, t/ha	Supplement	
				t/ha	%
Bayaut-1	Control	40.2	4.75		
	GACC (I)	44.2	5.32	0.57	12
	GACC (II)	43.4	5.03	0.28	5.9
	GACC (I) + GACC (II)	44.5	5.76	1.01	21.3
	Bayleton	43.6	5.12	0.46	9.7
	Tilt	43.3	4.98	0.23	4.8
Saykhun	Control	39.3	4.12		
	GACC (I)	43.1	4.98	0.86	20.9
	GACC (II)	44	4.71	0.59	14.3
	GACC (I) + GACC (II)	44.7	5.56	1.44	35
	Bayleton	44.1	4.66	0.54	13.1
	Tilt	43.2	4.45	0.33	8
Sanzar-8	Control	40.1	4.32		
	GACC (I)	44	5.32	1.0	23.2
	GACC (II)	45.5	4.83	0.51	11.8
	GACC (I) + GACC (II)	45.7	5.45	1.13	26.2
	Bayleton	44.3	4.56	0.24	5.6
	Tilt	43.4	4.5	0.18	4.2
Chillaki	Control	37.9	3.91		
	GACC (I)	43	4.43	0.52	13.3
	GACC (II)	44.4	4.37	0.46	11.8
	GACC (I) + GACC (II)	44.9	4.76	0.85	21.7
	Bayleton	42.8	4.32	0.32	8.2
	Tilt	43.2	4.23	0.31	7.9
Yonbosh	Control	40.4	4.55		
	GACC (I)	43.5	4.98	0.43	9.5
	GACC (II)	44	4.71	0.16	3.5
	GACC (I) + GACC (II)	44.6	5.12	0.57	12.5
	Bayleton	43.4	4.66	0.11	2.4
	Tilt	43.2	4.61	0.06	1.3

During the conducted experiences we observed a positive influence of the preparation of GACC on decrease in affection of sorts of wheat by a yellow rust in comparison with known fungicides of bayleton, tilt. The influence of GACC preparation shows a special attention after spraying. While in the first variant of experience (I) seeds of sorts of wheat is pickled before the sowing, in the second variant (II) preparation was sprayed before inoculation spores of a yellow rust, and in the third variant (I) + (II) seeds of sorts of wheat is pickled with the preparation of GACC before sowing and conducted spraying before inoculation.

The received results show diagnostics and a condition of fields by the period of performance of these researches. Apparently from the data affection of sorts of wheat of Sayhun, Yonbosh are approximately identical, a rather low sensitive Bayaut-1, Sangzar-8 and Chillaki are high affected. GACC is rather effective, which on 100 % protects from a yellow rust of Bayaut-1, 85 % of Sayhun and Yonbosh and on 65 % of Sanzar-8 and Chillaki.

At the same time bayleton shows 83 % of efficiency at sorts of Bayaut-1 and Sayhun, 80 % at Yonbosh, 70 % at Sanzar-8 and 60 % at Chillaki. As for tilt, it protects from disease by yellow rust a sort of Bayaut on 70 %, Sayhun and Yonbosh on 60 %, Sanzar-8 and Chillaki of 50 % accordingly.

Moreover, on the conducted experience on protection of winter sorts of wheat with usage of the preparation of GACC

and fungicides of bayleton and tilt are counted up the productivity of sorts of wheat (Table 1). The received results show that the appreciable supplement of productivity of grains of wheat is observed at two-multiple processing of wheat with the preparation of GACC: before sowing and in the period of vegetation of wheat.

Thus, the created GACC preparation on the basis of natural compound proved much more effective than the fungicides of bayleton and tilt.

It has been defined the presence of phenolic compounds in fabrics of samples of wheat after inoculation of disputes of a yellow rust (table 2). Phenolic compound, pickling doesn't admit the growth of rust fungus. It enhances the resistance of wheat to disease.

It is important to make comparison between the impact of preparation GACC and fungicides of bayleton and tilt on the formation of wheat phenolic compounds. Therefore we took 100 mg. phenol compound and we put its solution on paper chromatography. And then we isolated separately all phenolic compound. We defined them through the standard phenol compounds. They are following: Ferulic acid ( $R_f-0.31$ ), n-kumaric acid ( $R_f-0.46$ ), Cofein acid ( $R_f-0.28$ ), n-oxybenzoic acid ( $R_f-0.61$ ), gall acid ( $R_f-0.72$ ), hallocatehin ( $R_f-0.49$ ), catehin ( $R_f-0.64$ ), kvercetin ( $R_f-0.70$ ), kempherol ( $R_f-0.77$ ), rutine ( $R_f-0.64$ ). Then we determined the quantity of phenolic compounds (table 2).

Table 2. – Changing in the quantity of phenolic compounds in wheat under the influence of GACC and Bayleton

Scheme of experience	Phenol compounds	Saykhun	Chillaki	Sanzar-8
		Mass of phenol quantity, mk/100 gr		
Control	Ferulic acid	155	143	151
	n-kumaric acid	132	101	112
	Cofein acid	99	112	123
	n-oxybenzoic acid	25	33	41
	Gall acid	89	77	83
	Hallocatexin	91	89	93
	Catexin	77	100	106
Bayleton	Ferulic acid	156	161	149
	n-kumaric acid	138	98	124
	Cofein acid	102	117	133
	n-oxybenzoic acid	25	36	39
	Gall acid	98	85	95
	Hallocatexin	108	95	111
	Catexin	71	113	99
GACC	Ferulic acid	405	342	311
	n-kumaric acid	198	168	177
	Cofein acid	122	171	189
	n-oxybenzoic acid	59	55	52
	Gall acid	213	198	208
	Hallocatexin	169	137	145
	Catexin	131	127	128

It turns out the quantity of ferulic acid was by far high both in control and under the influence of GACC and bayleton. However, n-oxybenzoic acid was made minimal quantity than others. Besides, the table dates showed that a number of phenolic compounds were changed little than the influence of GACC.

The results of the investigation showed that the quantity of ferulic acid, n-kumaric acid, gall acid, hallocatexin, and katexin is increased under the influence of GACC preparation. It is known [15], these phenolic compounds display high physiological activity on the formation of lignin and protect plants from biotic and abiotic stresses [16–19].

## Discussion

GACC was characterized by the property of immunostimulus that has been mainly shown by cytological methods in relation to pathogen causing a rust. In modeling experiences it has been also established that GACC behaves as a regulator of growth possessing cytokinin effect (Dalimov and Kushiev). While in structure GACC there is glycyrrhizin acid.

From the literary data it is known [20–21] that glycyrrhizin acid in concentration of  $10^{-8}$ – $10^{-6}$  M has stimulating action of plants. Besides, in laboratory tests it is established that glycyrrhizin acid and its aglycon glycyrrhizinic acid in concentration

of  $10^{-8}$ – $10^{-6}$  M increase indicators of growing cotton seeds. The maximum stimulating effect was observed in concentration ( $10^{-7}$ ). On physiological tests on aucyene glycyrrhizin acid of  $10^{-7}$ – $10^{-6}$  M similarly IAA stimulates a gain of primary growing of wheat and the formation of roots at sheet shanks of a string bean, and in concentration of  $10^{-8}$ – $10^{-7}$  M also stimulates S-IAA transport in primary growing of a cotton.

Proceeding from it is possible to tell that GACC has stimulating activity and consequently shows high efficiency in the conducted experiments.

Besides the preparation of GACC contains a biological active copper component in the structure. The role of the copper in a life of plants is rather specific: copper cannot be replaced by any other element or their sum.

Bringing in high doses of nitric fertilizers strengthens requirement of plants for copper and promotes an aggravation of symptoms of copper insufficiency. It specifies that copper plays an important role in a nitric exchange and makes a peculiar part of specific enzymes structure which participates at biosynthesis immunomodulators.

One of the immunity mechanisms is capacity of plants to form phenol compounds in reply to antibiotic substances infection. As for characteristic features of copper-contained proteins that they enhance of resistance of plants against fungi diseases by stimulation of synthesis of phenol compounds in cells of plants.

Lately it has been obvious that phenol compounds in comparison with simple structure are capable to carry out a role of warning (signal) substances in interrelations of a plant — owner with fungus and some parasitizing plants. The Plant — owner synthesises these signal substances, parasitizing organisms respond to their the genes, which are necessary for realization of the subsequent stages of interaction.

From conducted experimental researches we have determined that many phenolic compounds considerably suppress the vital activity of fungies, including rusts of wheat. Besides there are many experimental data showing higher toxicity of oxidised polyphenols in comparison with their restored forms. From here there is an assumption that during the affection of plants an oxidation polyphenols of oxidising enzymes are arised (in particular, polyphenoloxidaz) with formation of toxic substances which it is more active than the restored polyphenols, oppress the growth of fungi. As to the formation of phenoloxydaz, it depends on an available microelement of copper. Thus, from an available copper component in the structure of GACC the formation of phenoloxydaz is intensified that it will lead to the oppression of fungi with the increase in the quantity of phenolic compounds (Table 2).

Thus, glycyrrhizin acid available in the structure of GACC stimulates the growth and development of wheat, and the copper component suppresses the development fungus with stimulation the formation of phenol compounds.

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## Change of the milk productivity in karakul sheep under feeding in different level of the feeding and their impact on growth and development of the lambs

**Abstract:** Article Bazarov B.M. and Razhamuradov Z. T. on this topic “Changes in the milk production in karakul sheep when fed different feeding level and their impact on growth and development of the” lambs. The article presents the materials obtained in the study of the influence of standardized feeding on milk production and its chemical composition. Experimental studies have identified and established a positive influence normalized feeding of pregnant ewes in lactating and seasons. Established that the winter and early spring, the organization of full feeding improves metabolism queens organism and thus increases milk production.

**Keywords:** Karakul sheep, breed, physiological, clinical, pregnant sheep, lactation, milk yield, growth and development of lambs, feeding, diet, lack of nutrients, normalized, roughage.

### Actuality

Physiological and clinical status, hematological indices of sheep and goats within the body, in accordance with the change of seasons changed several times — in heat and coming to hunt pregnant sheep, lactation and barrenness. These state of the organism of animals is accompanied by a change in biochemical processes occurring in the body, and of course, change the body's need for nutrients. This regard, the organization Feeding Karakul sheep in a market economy to study the effect of different feeding of levels in different physiological states has both theoretical and practical importance.

In the winter and early spring there is a rapid development and the formation of the embryo and newborn lamb health associated with the levels of metabolism that occur in the body of ewes during these periods of life. This helps ensure the body Karakul ewes in the second half pregnant sheep and early lactation essential nutrients and other food components. The level occurring in their body metabolism is associated not only with the physiological state of queens, but also on the type and level of feed coming from outside [8, 3–5].

The vitality of newborn lambs, and their resistance to the influence of environmental factors and future productivity, directly linked to the chemical composition and nutritional value of consumed fodder, as well as the biological properties of synthesized mother's milk [1, 5–7].

Milk period — the most responsible in the rearing, the purpose of which is to obtain a further highly, healthy, hardy animals, well-paying food products and the adaptation to local conditions. It should be noted, that in the known literature of this field, only the operation performed in European countries and only sheep, not conducted in fine-fleece such work karakul. Proceeding from the above, we believe that the study of the effect of different levels of feeding during the winter season and early spring on milk production and quality of milk in the synthesized karakul sheep is an urgent problem. Thus, the determination and the knowledge of the processes occurring in animals, makes it possible to determine the required rate of dry matter, protein and energy exchange in the diet of sheep. However, in Uzbekistan at the year-round grazing karakul sheep Similar studies have not been conducted.

As a result of long-term observations, that are determined, these periods of the year in the diet of small cattle was insufficient

quantity of feed consumed, and the insecurity of the body of sheep and goats with the necessary nutrients. As a result of these adverse events in individuals observed abortions, stillbirths, and diseases of various diseases most queens [2, 10–14].

Thus, in order to determine the effect of different levels of feeding on milk production of karakul sheep and lambs on the development we have carried out experimental research.

### The purpose and objectives of the study

In connection with the above, in carrying out production tests objective was to examine the effect of standardized feeding Karakul ewes on for metabolic processes, changes in body weight, milk production and the viability of newborn lambs, as well as on the dynamics of growth and development after weaning. Based on the data to make recommendations to farmers about the effectiveness of standardized feeding ewes at the most crucial times of the year in the life of the queens.

To achieve the goal it was necessary to solve the following specific objectives:

- Detailed rules to organize the feeding of ewes [4, 9–11] taking into account the body weight and condition, as well as complement the missing part of the diet of nutrient supplementary feeding;
- Determine the number of nutrient intake and digestibility coefficient of the individual components of the diet [3, 13–15];
- Determine the chemical composition of milk and milk production test mares;
- To determine the cost-effectiveness of standardized feeding Karakul ewes during pregnant sheep and early lactation.

### Material and Methods

The production tests were carried out for 3 months (January, February and March 2012–2013) on the uterus polustoylovogo content (experimental group) and the uteri contained without feeding on pasture (control group). Experimental animals of both groups underwent a veterinary examination and the age, body weight, physiological state, astrakhan type and constitution were analogous, quite consistent for zootechnical and physiological experiments [5, 2–6]. Amid balance experiments were conducted physiological and biochemical experiments to determine the amount of the consumed nutrients

and their digestion in the gastrointestinal tract of ewes test [6, 7–9]. Feeding ewes produced experimental methods listed above groups — periods, and it consisted of a preliminary (23 days) and the reference periods (7 days) [7, 3–6]. Milk fat and protein was determined by calculation. The dry matter content, lactose — refractometric method and the amount of incineration ash of the sample was determined in a muffle oven. All received digital content were statistically processed by the method of E. K. Merkuryeva [6, 23–26].

### Results and discussion

From the data obtained, it is seen that the ewes received normalized ration observed normalization digestion in the rumen microbial activity and improvement in its content. It can be considered on the basis of the data that the test group of ewes on the actual consumption of the diet components, fully meet the needs of the organism in nutrients, and is consistent with the standards of pregnant and lactating mares, and the current is now widely used for feeding sheep.

These indicators are in the experimental group reached — 2054.71 ± 6.83 kg. of dry matter and 151.85 ± 1.71 grams of digestible protein. Actual consumption nutrients ewes in the control group compared to the experimental group were significantly lower and amounted to a dry matter basis — 479.46 ± 5.41 kg. (23.3%) and digestible protein — 14.3 ± 0.46 g. (9.42%), respectively (Tab. 1).

Table 1. – The amount actually consumed nutrients in experimental animals

№	Indicators	Groups	
		Control	Experienced
1	Dry matter, kg.	479.46 ± 5.41	2054.71 ± 6.83
2	Organic matter, g.	427.2 ± 3.21	1912.93 ± 1.79
3	Crude protein, g.	36.40 ± 1.87	279.44 ± 2.67
4	Digested protein, g.	14.3 ± 0.46	151.85 ± 1.71
5	Crude fat, g.	11.84 ± 2.03	73.19 ± 0.54
6	Crude fiber, g.	193.7 ± 3.12	643.13 ± 2.46
7	BEV, g. (nitrogen-free extractives)	185.74 ± 0.21	917.22 ± 3.32
8	Ash, g.	52.74 ± 0.89	140.54 ± 0.98

As is known, in determining the biological value and quantity of milk received experimental ewes, the study of physical and chemical properties of the milk is the main natural factor. According to data obtained by us it was determined the effect of feeding ewes normalized in the second half pregnant sheep and early lactation period, a change in body weight of ewes and newborn lambs, as well as growth and development of lambs in the first two months of life. Along with this determined amount of milk and its allocated physical and chemical properties and compared with the control group data. According to data in the literature studied Karakul sheep compared to other breeds of sheep is a large-fruited breed of sheep. The live weight of newborn lambs in accordance with the biological characteristic of the breed make up 10–12% by weight of the mother's body [10, 17–19].

N. Bobokulov [1, 5–8], having studied some biological properties of Karakul sheep and other species, says that compared to other

breeds Karakul lambs have high growth rate and these indicators are not inferior even precocious meat — wool breeds of sheep. According to the author, newborn lambs Karakul breeds had a live weight of 10.8% by weight of the constituent body of the mother, while the figure was hissar — 6.4%, jaidar — 7.9–9.2%, Saraj and fine-wooled — 7,7% respectively.

It should be noted that, in connection with the distribution of land among farmers, was dramatically reduced the area of pasture land and the loss of them needed to feed sheep stocks and species [9, 8–14].

In addition, sheep farmers in order to generate additional income in the equine companies use a variety of hormonal treatments that led to the crushing of live weight, instability to various diseases of the body and shoot down the rate of growth and development of the resulting offspring. At this point, the live weight of the resulting offspring is in the range of 8.0–9.5% by weight of the mother's body [2, 8–11]. It should be noted that, in connection with the distribution of land among farmers, was dramatically reduced the area of pasture land and the loss of them needed to feed sheep feed stocks and species [9, 16–18].

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In most cases, ewes milk production depends on belonging to a constitutional type and class of mares, on this basis, they are divided into dairy, dairy and moderately low milk individuals. According to certain authors, if the ewe per day secrete less than 500 ml. of milk, they are, low milk from 500 to 750 ml. — to moderate milk and more 750 ml., they are abundant milk. Results of analyzes of scientists of the Uzbek Research Institute of Astrakhan showed that, if the daily milking ewes account for more than 750 ml., the live weight of the newborn lamb is 4.17–4.25 kg., if the daily milk yield is in the range of 500–750 ml., the 4.01–4.05 kg., and if less than 500 ml., the amounts of 3.80–3.96 kg. According to the authors, dairy ewes identical impact on the daily rate of growth and development of lambs, and the data confirm the above, and the average daily gain of lambs was 193, 164 and 153 g. respectively [10, 22–27].

Table 2 shows the data obtained during the experiment to change the live weight of ewes and their newborn lambs, as well as milk production. During the experience, we determined that, in the control group, body weight newborn lambs averaged 3.30 ± 2.04 kg., this amounts to 7.80% of live weight of ewes, and the figures in the experimental group was — 4.03 ± 2.39 kg., and 9.53% respectively.

Table 2. – Changing body weight and milk production under the influence of the experimental ewes feeding conditions

Indicators	Groups			
	Control		Experienced	
	Prior experience	After the experience	Prior experience	After the experience
The live weight of ewes, kg.	42.32 ± 1.78	33.4 ± 1.96	42.25 ± 1.64	43.71 ± 0.09
The live weight of newborn lambs, kg.	3.30 ± 2.04	7.98 ± 3.07	4.03 ± 2.39	12.01 ± 1.01
The daily milk production, a liter	476.7 ± 6.81		748.3 ± 2.73	
The average daily gain of lambs, g.	152.0 ± 0.78		188.7 ± 0.57	



The average daily gain of lambs of experimental group averaged  $188.7 \pm 0.57$  g., and in the control group —  $152.0 \pm 0.78$  g, or 19.5 % favor the experimental group. Our findings correspond to the data of some authors, the results of experiments carried out in good years for fodder and climatic conditions. In addition, we studied the effect of standardized feeding on chemical composition and biological value of milk, as well as the body's resistance lambs fed on mother's milk in a lactation period of the year. In our opinion, the study of this problem makes it possible to predict the natural resistance of the organism growing lambs left on to replenish the herd.

The content of dry matter in milk, as well as its components — fat, total protein, casein, and lactose, was in all cases more in the milk of experimental groups than in the control group (table 3).

At six months of age in lambs, that is, if the beat of the mothers received differences at birth survived, and the difference between groups was 5.16 kg., it is said that during the grazing lambs with their mothers, they used the same in the same amount of feed. In addition, since the beginning of the birth, feeding biologically high-grade food means lambs of the experimental group had greater average daily gain. On this basis, we believe that the

difference between the comparison groups has found credible evidence.

Table 3. – Physico-chemical properties of experimental ewes milk

№	Indicators	Groups	
		Control	Experienced
1	Dry substance, %	$12.79 \pm 0.15$	$15.54 \pm 0.24$
2	Fat, %	$4.82 \pm 0.16$	$5.20 \pm 0.09$
3	Total protein, %	$3.52 \pm 0.04$	$4.16 \pm 0.17$
4	Casein, %	$2.86 \pm 0.04$	$3.40 \pm 0.18$
5	Lactose, %	$4.46 \pm 0.03$	$5.19 \pm 0.13$

#### Conclusions

We believe that the organization of the normalized feeding karakul sheep since the beginning of winter, before the beginning of the spring period, make it possible to keep the body weight of ewes in the middle of fatness and get the required amount of high-grade milk. This can contribute to obtaining a larger litter. In the future, it can serve as a means for farmers to increase of production and conservation of highly Karakul sheep, as well as constitute a major factor in the economic sector.

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## Effect of 15-hydroxyazomethine and 15-acetoxyazomethine, diterpenoid alkaloid atisine derivatives, on post-rest potentiation in rat papillary muscle

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**Abstract:** We studied the effects of diterpenoid alkaloids 15-acetoxyazomethine and 15-hydroxyazomethine on post-rest potentiation behavior in rat papillary muscle. The results show that 15-AAA produced a concentration-dependent biphasic effect on post-rest potentiation (PRP) and at low concentrations ( $\leq 5 \mu\text{mol/l}$ ) enhanced it, whereas, at higher concentrations

( $\geq 5 \mu\text{mol/l}$ ) slightly depressed it. One possible explanation for the biphasic effect of 15-AAA is as follows: at low concentration it by activation of SR  $\text{Ca}^{2+}$  load, may result in an increase the amount of  $\text{Ca}^{2+}$  available for release, resulting in enhancement of PRP; at higher concentration, it by inhibition of  $\text{Ca}^{2+}$  influx and impairment of SR function may result in a decrease the amount of  $\text{Ca}^{2+}$  released by SR, resulting in depression of PRP. In contrast, 15-HAA at all concentrations more strongly than 15-AAA depressed PRP, presumably, due to its more pronounced the negative inotropic effect. These results shows that 15-AAA and 15-HAA has dual effects on PRP through a complex modulation of  $\text{Ca}^{2+}$  handling in cardiac cell, which may involve the modification of  $\text{Ca}^{2+}$  transport through sarcolemmal membrane and on the level of SR. These findings suggest that a large portion of negative inotropic effect of 15-AAA and 15-HAA may, at least, are related to the inhibition of  $\text{Ca}^{2+}$  influx and, in part, to the subsequent impairment of SR function resulted in decreased the amount of  $\text{Ca}^{2+}$  being taken up and released by SR leading to depression of contractility.

**Keywords:** Alkaloids, post-rest potentiation, sarcoplasmic reticulum.

### Introduction

15-hydroxyazomethine atisine (15-HAA) and 15-acetoxyazomethine atisine (15-AAA), derivatives of diterpenoid alkaloid atisine, isolated from *Aconitum* plant species, have a pronounced antiarrhythmic effect [1]. Previously we demonstrated that 15-HAA and 15-AAA exerted significant negative inotropic effects and markedly depressed the contraction force in the electrically stimulated rat papillary muscles [2]. In these preliminary studies the negative inotropic effects of these alkaloids were found attenuated by lidocaine and reduced after inactivation of  $\text{Na}^+$ -channels by elevated extracellular KCl concentration (24 mmol/l). Furthermore, these alkaloids significantly inhibited the contraction force induced by elevation in extracellular  $\text{Ca}^{2+}$  concentration, which was mainly mediated by  $\text{Ca}^{2+}$  influx via L-type  $\text{Ca}^{2+}$  channels. Together these results suggested that the negative inotropic effect of 15-AAA and 15-HAA probably were provided by mechanism similar to that of some class 1 antiarrhythmic drugs, which by inhibition of  $\text{Na}^+$  channels and subsequent impairment of  $\text{Ca}^{2+}$  handling reduced the intracellular concentration of  $\text{Ca}^{2+}$  ( $[\text{Ca}^{2+}]_i$ ) and depressed the contraction force [3; 4]. It is considered that the reduction in  $[\text{Ca}^{2+}]_i$  produced by these drugs mediated mainly by  $\text{Na}^+/\text{Ca}^{2+}$  exchanger which when the  $\text{Na}^+$  channels were blocked and the intracellular concentration of  $\text{Na}^+$  reduced will decrease  $\text{Ca}^{2+}$  influx, and enhance  $\text{Ca}^{2+}$  efflux and thereby may reduce  $[\text{Ca}^{2+}]_i$  [5]. This is compatible with our results obtained in the previous study, namely that the 15-AAA and 15-HAA significantly inhibited the contraction induced by low  $\text{Na}^+$  solution and ouabaine, which mainly are due to the  $\text{Ca}^{2+}$  entry via  $\text{Na}^+/\text{Ca}^{2+}$ -exchanger [6]. These results suggested that the inhibition of  $\text{Ca}^{2+}$  influx via  $\text{Na}^+/\text{Ca}^{2+}$  exchanger by 15-AAA and 15-HAA also may be involved in their negative inotropic effect. However, it is widely accepted that the  $\text{Ca}^{2+}$  entry through  $\text{Na}^+/\text{Ca}^{2+}$  exchanger may contribute not only to control of  $[\text{Ca}^{2+}]_i$  but have a significant effect on the amount of  $\text{Ca}^{2+}$  being taken up and released by the sarcoplasmic reticulum (SR) [7; 8]. Considering this we assumed that inhibition of  $\text{Ca}^{2+}$  influx through  $\text{Na}^+/\text{Ca}^{2+}$  exchanger by 15-AAA and 15-HAA could also reduce the  $\text{Ca}^{2+}$  content in SR, resulting in depression of the contraction force thus inducing the negative inotropic effect. Therefore, to examine the effect of 15-AAA and 15-HAA on storage and release functions of SR their effects on post-rest potentiation (PRP) of contraction force in rat papillary muscle were studied.

### Materials and methods

Experimental protocol and conditions for preoperative care were approved by the animal use committee of our institution. Adult male Wistar rats weighing 200–250 g. were anaesthetized with sodium pentobarbital ( $50 \text{ mg kg}^{-1}$ , i. and then sacrificed by cervical dislocation. The papillary muscles from the left ventricles of the rat hearts about 0.5–0.8 mm in diameter and 1–3 mm. in length were dissected and mounted in a tissue bath (STEIRT, HSE, Germany)

of 3 ml. volume and superfused continuously with Krebs solution. The Krebs solution contained (in mmol/l) NaCl 118, KCl 4.7,  $\text{MgSO}_4$  1.2,  $\text{KH}_2\text{PO}_4$  1.2, glucose 10,  $\text{NaHCO}_3$  24,  $\text{CaCl}_2$  2.54. The solution was continuously gassed with  $\text{O}_2/\text{CO}_2$  mixture (95%/5%)  $\text{CO}_2$  to provide a pH of 7.4 and was kept at  $37^\circ\text{C}$ . The preparation was mounted horizontally in the tissue bath with one end attached to a hook and the other end attached to an force transducer (Type F30, Grass, Quincy, Mass., USA). Each preparation was stretched to a length at which maximum developed force was evoked and allowed to equilibrate for at least 1 h prior to experiments. The preparations were field-stimulated at a rate of 0.1–5 Hz. by two platinum electrodes with rectangular wave pulses of 10 ms. duration at twice the threshold voltage delivered from an electronic stimulator (ESL-2, Russia). Contractions were recorded on a chart recorder (TZ 4620, Czech Rep.) and after conversion to digital form stored on a personal computer. To examine the effects of 15-HAA and 15-AAA on storage and release functions of SR we studied their effects on post-rest potentiation (PRP) of contraction. The contraction during PRP was studied after a rest period of variable duration, and at  $[\text{Ca}^{2+}]_i$  of 0.5 mmol/l because its study is more sensitive at a low  $[\text{Ca}^{2+}]_o$ . The results of these experiments are reported as relative potentiation which was quantified by normalizing peak amplitude of the first potentiated contraction (B1) to the steady state contraction recorded immediately before the rest interval (B0): B1/B0.

All drugs were purchased from Sigma-Aldrich Chimie (Sigma, St. Louis, Mo, USA.). All values are presented as mean  $\pm$  SD. Student's t test was used to compare test and control values and values of  $P < 0.05$  were considered significant. Statistical analysis was performed using OriginPro 7.5 software (OriginLab Co., U.S.A).

### Results and discussion

Post rest behavior is a tool to study the activity of SR, because it reflects the ability of the SR to store and release  $\text{Ca}^{2+}$  [9; 10]. In rat papillary muscle, the first contraction after a period of rest (B1) is increased due to accumulation of  $\text{Ca}^{2+}$  in SR beyond that accumulated with regular stimulation, therefore, it is more significant than the last beat before the rest (B0). In our experiments in rat papillary muscle stimulated at steady state frequency (0.1 Hz.), the amplitude of the B1 after the rest period always increased compared with amplitude of steady-state contraction before the rest (B0). The ratio B1/B0, which reflects the relative PRP and was used as an index of SR activity, increased with increasing duration of the rest period until a plateau was reached at 30-s rest. As it is illustrated in Fig. 1A, the amplitude of B1 after rest was  $189.7 \pm 6.2\%$  in comparison with amplitude of B0 (taken as 100%), providing a ratio B1/B0  $1.89 \pm 0.10$ . After application of  $5 \mu\text{mol/l}$  15-AAA both B0 and B1 increased by  $20.6 \pm 4.9\%$  and  $76.6 \pm 8.1\%$ , respectively, of control obtained before 15-AAA (Fig. 1B). The increase in B0, induced by 15-AAA, can be explained by its positive inotropic effect, which by increasing B0 should simultaneously increase the B1,

because the state of this contraction almost linearly depends on the state of preceding contraction B0 [11]. However, the 15-AAA caused more pronounced increase in B1 than B0, providing the ratio B1/B0  $2.20 \pm 0.18$ . Taking into account that the ratio B1/B0 reflect the  $\text{Ca}^{2+}$  storage and release functions of SR [12; 13], its increase suggest that 15-AAA enhances the PRP possible by modulation of these function of SR. This is in agreement with the finding that relative potentiation caused by 15-AAA was not affected by propranolol and nifedipine, indicating that enhancing effect of 15-AAA is not related to stimulation of  $\beta$ -adrenergic receptors and activation of L-type  $\text{Ca}^{2+}$  channels (data not shown). It should be noted that positive inotropic effect produced by 15-AAA also was resistant

to propranolol and nifedipine [2]. To further examine the effect of 15-AAA on the loading and releasing functions of SR we used caffeine, which by enhancing  $\text{Ca}^{2+}$  release and inhibiting its reuptake processes, impaired either SR release function or the capacity of SR to load  $\text{Ca}^{2+}$  during the rest period [14]. As it can be seen in Fig. 2A, caffeine in the concentration of 8 mmol/l significantly decreased the ratio B1/B0, indicating that PRP was completely abolished due mainly to depletion of the SR  $\text{Ca}^{2+}$  store. Application of 15-AAA ( $5 \mu\text{mol/l}$ ) on the background of developed caffeine effect did not provide recovery of normal muscle response on post-rest test (Fig. 2A), suggesting that the enhancing effect of 15-AAA depends on the  $\text{Ca}^{2+}$  storage or release function of SR.

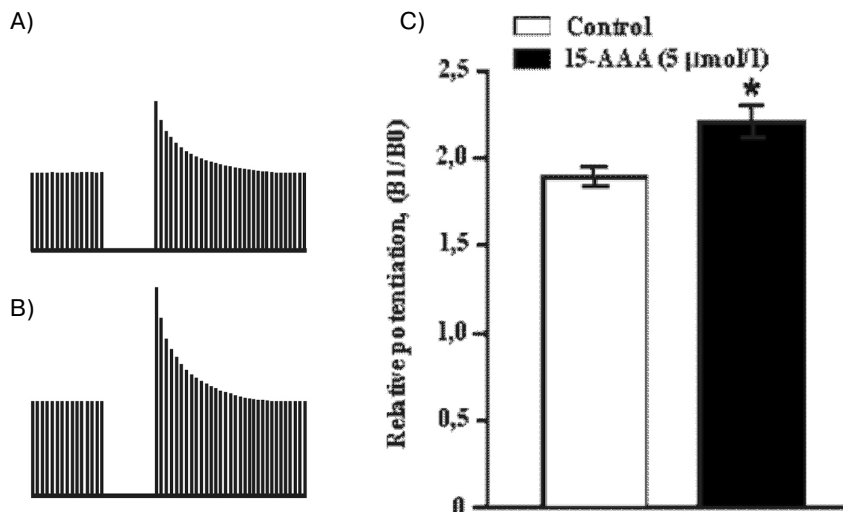


Fig. 1. Effect of 15-AAA on post-rest contractile behavior in rat papillary muscle: A) Typical tracings representing developed post-rest contraction after 30 s rest period; B) Enhancing effect of  $5 \mu\text{mol/l}$  15-AAA on post-rest potentiation of contraction; C) The relative potentiation of contraction (the ratio B1/B0) before and after administration of  $5 \mu\text{M}$  15-AAA. Results are reported as mean  $\pm$  SEM ( $n=5$ ) (\* —  $P < 0.05$ , compared to control)

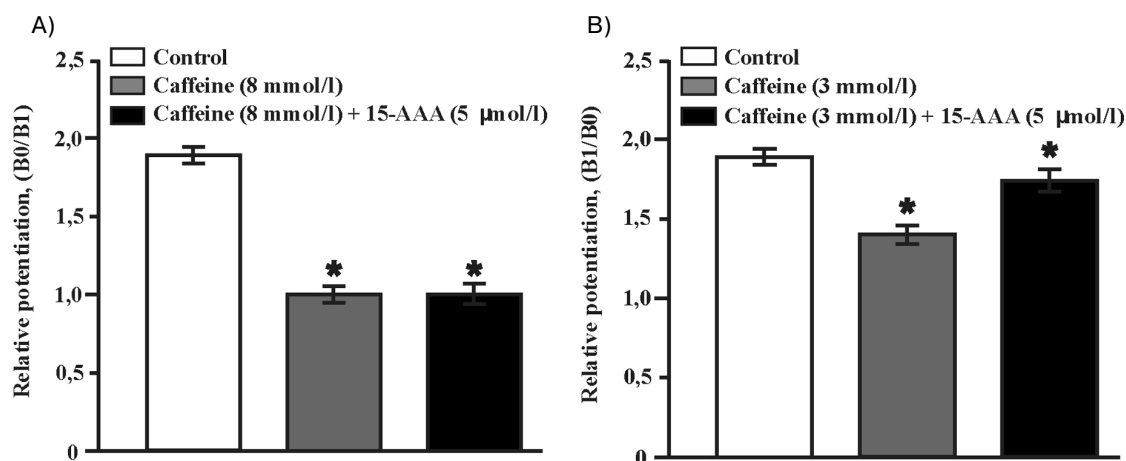


Fig. 2. Influence of caffeine on enhancing effect of 15-AAA on relative potentiation of contraction in rat papillary muscle. Effect of 15-AAA ( $5 \mu\text{M}$ ) in the presence of 8 mmol/l (A) and 3 mmol/l (B) caffeine. Results are reported as mean  $\pm$  SEM ( $n=5$ ) (\* —  $P < 0.05$ , compared to control)

This assumption is supported by results obtained in conditions when PRP was partially reduced by 3mM caffeine, as evidenced by the reduction in the ratio B1/B0. As it can be seen in Fig. 2B the ratio B1/B0 reduced by caffeine (3mmol/l) to  $1.4 \pm 0.12$ , after application of 15-AAA ( $5 \mu\text{mol/l}$ ) again increased to  $1.74 \pm 0.14$ . These results indicate that when the PRP partially preserved, 15-AAA is still able to enhance it, suggesting that this effect of 15-AAA probably is associated with modification of either  $\text{Ca}^{2+}$  storage or release functions of SR. To obtain a better insight into the mechanisms by which 15-AAA

enhanced PRP, we further investigated its effects in the presence of cyclopiazonic acid (CPA), a selective inhibitor of SR  $\text{Ca}^{2+}$ -ATPase (SERCA2). In our experiments application of  $30 \mu\text{mol/l}$  CPA significantly decreased both B0 and B1, as well as, the ratio B1/B0, indicating that PRP was completely abolished (Fig. 3A). This effect of CPA is due mainly to inhibition of the  $\text{Ca}^{2+}$  loading in the SR and subsequent depletion of  $\text{Ca}^{2+}$  store available for release [15; 16]. Application of 15-AAA ( $5 \mu\text{mol/l}$ ) on top of  $30 \mu\text{mol/l}$  CPA, when PRP completely abolished, it did not provide recovery of PRP (Fig. 3A).

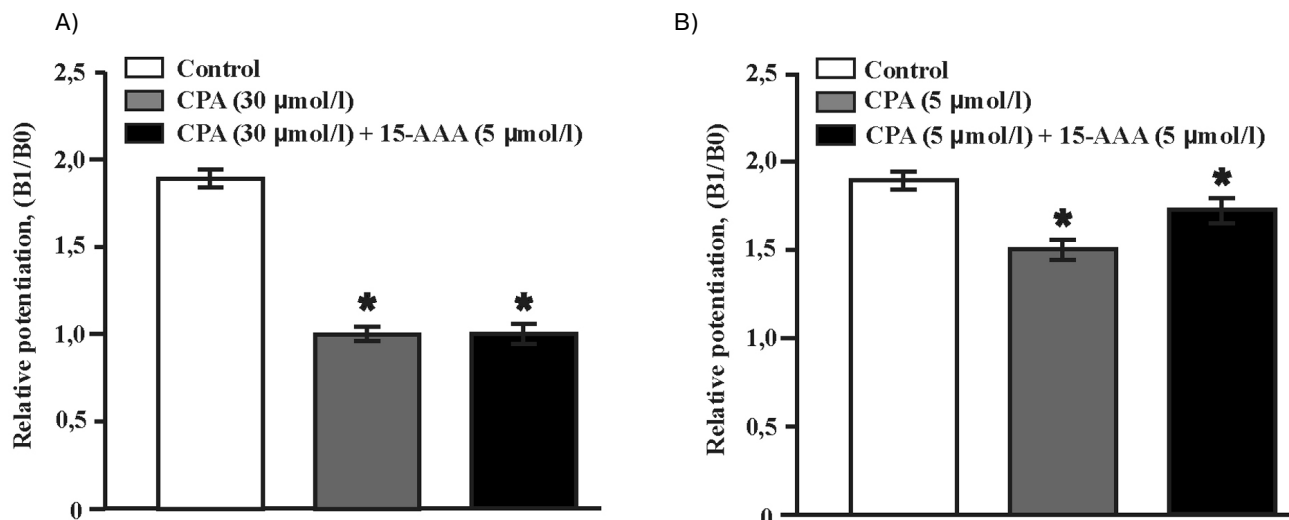


Fig. 3. Influence of CPA on enhancing effect of 15-AAA on relative potentiation of contraction in rat papillary muscle. Effect of 15-AAA (5µM) in the presence of 30 µmol/l (A) and 5 µmol/l (B) CPA. Results are reported as mean  $\pm$  SEM (n=5) (\* —  $P < 0.05$ , compared to control)

However, in the presence of 5 µmol/l CPA, when the PRP partially preserved, according to the ratio B1/B0 ( $1.5 \pm 0.11$ ), application of 15-AAA (5 µmol/l) still increased it to  $1.72 \pm 0.12$ . These results shows that when PRP was partially preserved 15-AAA still is capable to enhance contraction after rest. This suggest again that enhancing effect of 15-AAA is associated with SR function and presumably is due to modulation of  $Ca^{2+}$  release function or the capacity of SR to load  $Ca^{2+}$  during the rest period. Based on these data we conclude that the enhancing effect of 15-AAA could be explained

either by increase in  $Ca^{2+}$  accumulation in SR during the rest period or by increase in  $Ca^{2+}$  available for release from SR.

In contrast, to low concentration, which enhanced PRP, high concentrations of 15-AAA ( $\geq 5$  µmol/l) significantly depressed the steady-state contraction as well as the first contraction after rest. As it can be seen in Fig. 4, in the presence of 30 µmol/l 15-AAA, both B0 and B1 significantly decreased to  $12.3 \pm 2.6\%$  and to  $18.1 \pm 3.4\%$ , respectively, from control values, obtained in absence of 15-AAA.

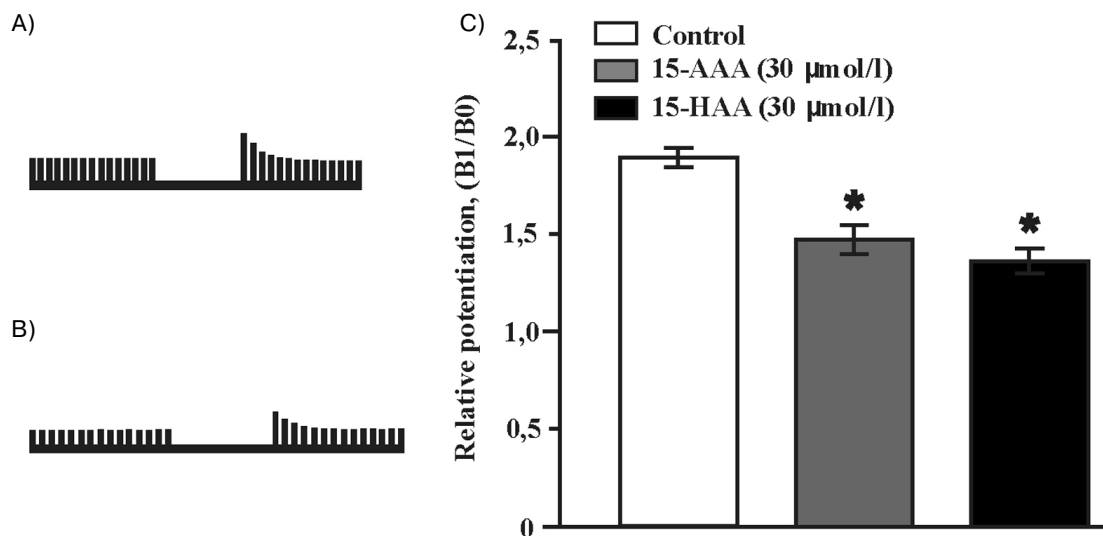


Fig. 4. Effect of high concentrations 15-AAA and 15-HAA on post-rest potentiation of contraction in rat papillary muscle. A), B) Representative tracings of the effects of 15-AAA and 15-HAA, both at 30 µmol/l; C) Effect of 15-AAA and 15-HAA (both at 30 µmol/l) on relative potentiation of contraction. Results are reported as mean  $\pm$  SEM (n=5) (\* —  $P < 0.05$ , compared to control)

The decrease in B0 caused by high concentration of 15-AAA, presumably is due to its negative inotropic effect, which is attributed to its  $Na^+$ -channel blocking properties [2]. It is well known, that the blockade of the  $Na^+$ -channels in cardiac cells may secondarily alter  $Ca^{2+}$  transport so that a decreased  $Ca^{2+}$  influx would reduce  $[Ca^{2+}]_i$  and, thus, suppress cardiac contractility [7; 12]. So, if this effect of 15-AAA is mainly due to a decrease in  $Ca^{2+}$  influx, the decrease in B0 should accompanied by a similar decrease in the B1, without significant changes in the ratio B1/B0. However, as it can be seen in Fig. 4A, despite the significant decrease in the absolute amplitude

of B1 the ratio B1/B0 reduced only to  $1.47 \pm 0.15$ , indicating that relative potentiation still well preserved. This shows that the depression of B1 by high concentration of 15-AAA, at least in part, can be explained by its simultaneous inhibition of  $Ca^{2+}$  influx and impairment of SR function. Together, these results suggest that 15-AAA has dose-dependent biphasic effect on PRP a possible explanation for which is as follows: at low concentration ( $\leq 5$  µmol/l), it by activation of SR  $Ca^{2+}$  load, may result in an increase of amount of  $Ca^{2+}$  available for release, resulting in enhancement of PRP; at higher concentration ( $\geq 5$  µmol/l), it by inhibition of  $Ca^{2+}$  influx and impairment of

SR function may result in a decrease the amount of  $\text{Ca}^{2+}$  being taken up and released by SR, resulting in depression of PRP. Almost similar effect on post-rest behavior, to that caused by 15-AAA at high concentrations, observed with 15-HAA, which at all concentrations induced only negative inotropic effect [2]. As it can be seen in Fig. 4B, application of 30  $\mu\text{mol/l}$  15-HAA significantly decreased B0 and B1 from control values to  $7.3 \pm 2.1\%$  and to  $10.2 \pm 4\%$ , respectively, providing the ratio B1/B0  $1.39 \pm 0.13$ . Comparison of the effects of 15-AAA and 15-HAA has shown that 15-HAA reduced both B0 and B1, as well as, the ratio B1/B0, more stronger than 15-AAA. This difference may be due to the more pronounced negative inotropic effect of 15-HAA and to the superimposed positive inotropic effect of 15-AAA which could limit its inhibitory action. Considering that suppression of B0 and B1 by 15-HAA was accompanied with significant reduction in the ratio B1/B0 this its effect can be attributed in part to impairment of the SR function. Thus, these results shows that 15-AAA and 15-HAA has dual effects on PRP through a complex modulation of  $\text{Ca}^{2+}$  handling in cardiac cell, which may involve the modification of  $\text{Ca}^{2+}$  transport through sarcolemmal membrane and on the level of SR. Together, these findings suggest that a large portion of negative inotropic effect of 15-AAA and 15-HAA may, at least, reflect interference with intracellular  $\text{Ca}^{2+}$  transport mechanisms and in part an impairment of SR function.

### Conclusion

Our results have shown that both 15-AAA and 15-HAA specifically affected the PRP in rat papillary muscle. 15-AAA produced a concentration-dependent biphasic effect and at low concentrations ( $\leq 5 \mu\text{mol/l}$ ) enhanced PRP, whereas, at higher concentrations ( $\geq 5 \mu\text{mol/l}$ ) slightly decreased it. One possible explanation for the biphasic effect of 15-AAA on PRP is as follows: at low concentration it by activation of SR  $\text{Ca}^{2+}$  load, may result in an increase amount of  $\text{Ca}^{2+}$  available for release, resulting in enhancement of PRP; at higher concentration, it by inhibition of  $\text{Ca}^{2+}$  influx and impairment of SR function may result in a decrease amount of  $\text{Ca}^{2+}$  released by SR, resulting in depression of PRP. Almost similar, but more strong effect on post-rest behavior, produced 15-HAA, which is due mainly to its more pronounced the negative inotropic effect. These findings suggest that 15-AAA and 15-HAA have dual effects on PRP through a complex modulation of  $\text{Ca}^{2+}$  handling in cardiac cell, which may involve the modification of  $\text{Ca}^{2+}$  transport on the level of sarcolemmal membrane and SR. We conclude that a large portion of negative inotropic effect of 15-AAA and 15-HAA may, at least, is related to the inhibition of  $\text{Ca}^{2+}$  influx and, in part, to the subsequent decreases in the amount of  $\text{Ca}^{2+}$  being taken up and released by SR, resulting in depression of contractile force. Further studies will be required to clarify these points.

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## Morphological features of pedolytical soils in Central Ferghana

**Abstract:** The paper presents the morphological characteristics of irrigated meadow saz soils of Central Ferghana. Arzyk-shokh horizons with negative water-physical and other properties, which are the result hydro accumulative processes in the desert zone are characterized.

**Keywords:** horizon, arzyk, shokh, meadow, accumulation, pseudomycelia, carbonate, illuvial.

On the basis of morphological features of soils reasonable idea can be taken on their chemical elemental and material composition, soil processes, soil regimes, and finally on the soil formation in the region.

The morphology of the soil is the result of long-term soil-forming process, the transition of maternal rocks to the new natural body — soil [1, 92–109; 2, 29–31].

Morphology of irrigated meadow saz soils of Central Ferghana as soils of other regions have slowly changing soil properties. However, to this condition generally affect agricultural technology, land reclamation and other land improvement, agricultural chemical techniques.

The morphology of the soil in the field condition make basis of soil research. In addition, soil research study begins with morphological features in the field condition.

The genetic soil horizons are characterized by a change in its properties in the vertical and some sense in the horizontal attitudes, connected with the influence of soil-forming factors on the parent rock.

Normally, transitions between the horizons are relatively gradual [3, 101–109]. However, it should be remembered that in the nature this regularity is not always maintained. In this case, in the Central Ferghana sharp transitions between individual horizons are occur, which result of firstly, primary non uniformity and secondly, results of the new soil-forming processes.

In his time to the genetic-geographical patterns of distribution and morphological characteristics of the soils of the Ferghana Valley drew attention Pankov M. A. [4, 23–33], who pointed out carbonate horizons in these soils.

Besedin P. N. [5, 9–21] exploring the genetic horizons of soils of the Ferghana Valley pointed out that the genetic horizons of hydromorphic soils in Central Ferghana accumulate sodium sulfate salt and calcium, in addition, he also pointed out that it is difficult to agree with arzyk carbonate, gypsum soils.

Kamilov O. C., Isakov V. Yu. [6, 101–107], Isakov V., Mirzaev U. [7, 221–227] call most upper horizon in these soils as horizon of arzyk soils. It is clear from the above that the direct research works dedicated to soils with arzyk-shokh horizons is not so much, and the soil profile in the conditions of Central Ferghana is very complex, irrigation also contributes its role to this question.

At the same time the soil profile in desert and irrigated agriculture condition is growing down except clay deposits in low and the formation of washed soils.

Here morphological characteristics of irrigated meadow saz soils of the desert zone in Central Ferghana are given.

6-A soil sample. Kushtepa District of Ferghana region of Uzbekistan, located in the desert zone. Takalyk village, farmer's land. From the main village road 50 meters to the north, 55 m. from the horizontal open repaired drainage, flat field, after sowing cotton seeds.

The depth of groundwater, which tastes bitter and salty at 14.04.2009 reached 200 cm.

A<sub>0</sub> 0–18 cm. Arable horizon, light gray, top is dry, to bottom there is increase in humidity, slightly dense, medium and heavy loam, lumpy, have loosely connected clumps, there are single roots and the roots of the past, extras are not observed, there are a gypsum and carbonate spots, smears on the bottom of horizon. Transition is sharp by density.

A<sub>1</sub> 18–32 cm. Subsurface horizon, light gray, light- and medium loamy, dense, loosely connected small lumpy structure, there are single roots, extras are not observed, carbonate-gypsum spots and gouges are larger than the previous horizon. Transition is sharp by density.

B<sub>1</sub> 32–55 cm. The transitional horizon, whitish-gray to yellow-brown color, very thick, shovel blade bounces when hitting, when hitting with a crowbar gives a special audio response, cemented horizon at breaking forms pieces with sharp polygonal, low humid, no extras, many new formations, on the surface of the horizon accumulation of water-soluble salts is observed.

This horizon is a striking example of the complex (mechanical, physical, chemical, and others.) geochemical barrier, whose role in the formation of soil and its fertility is not fully clarified. Transition to the next horizon is sharp by density.

B<sub>2</sub> 55–80 cm. The transitional horizon, light gray, there are some yellow-brown spots, wet, slightly dense, light and medium loamy, roots and the roots are not observed, a lot of new gypsum and carbonate formations, as well as water-soluble salts, have a significant iron and manganese compounds. Transition is gradual by color.

C<sub>1</sub> 80–140 cm. Parent rocks, light-gray color with brown and blue-gray spots, a lot of bluish spots, wet, slightly tight, cuts with a knife, medium loamy, no roots, there are some bright black spots, a lot of gypsum and carbonates, when hitting with a shovel crunches. Transition is gradual by color.

C<sub>2</sub> 140–200 cm. Parent rocks, ash-gray, a lot of dark brown and blue-gray spots, wet, medium loamy, alluvial-proluvial deposits, further groundwater under pressure.

From these materials, as well as from a description of other soil sample in the field shows that in Central Ferghana in the territory of irrigated meadow saz saline soils zone arzyk-shokh soils with poor air and water-permeable properties horizons at a depth of 32–55 cm., 18–33 cm., 93–111 cm. from the surface are spread.

These horizons are very dense and cemented, sometimes they are called pedolits, depth of these horizons in Central Ferghana from south to north is reduced, i. e., the horizons rise up to the soil surface.

The characteristic morphological features of these soils other than those include a high content of gypsum, calcium and magnesium carbonates and their sulfate salts, as well as a variety of soil texture.

Furthermore, there are cherry stain colors, which are formed in combination with oxides of iron and manganese, cover layers, pseudomycelium and other new formations are occur in these soils.

These types of new formations in the studied soils are presented as readily soluble salts, gypsum, and calcium carbonate. In the cavities readily soluble salt, gypsum, carbonates of calcium and magnesium, in some cases, the compounds of sesquioxides and manganese, phosphorus acidic iron are found. At most they appear as readily soluble salts, carbonates and gypsum.

In the so-called arzyk-shokh horizons new formations show the influence of saline groundwater, which lie not deep from the surface of the soil.

In these horizons new formations accumulate at large scale, where the primary soil material and soil-forming rock are almost indistinguishable. Also a special grouting horizon forms.

In the studied horizons new formations are not clean in mineralogical terms. Instead of carbonate and sulfate salts of calcium and magnesium sesquioxides and others substances are often observed. In these horizons manganese, phosphorus, silicon compounds and others are found.

The studied soils have humus-carbonate, or humus — arzyk-shokh profile, that presented with the union of the humus horizon with arzyk-shokh horizons at the bottom.

Compounds of iron, silicon, and salts of organic and mineral acids, carbonic and sulfuric acid salts of calcium, iron, magnesium sulfate and sodium chloride, depending on the soil-geochemical conditions fall to deposits and form new formations.

Thus dense, cemented hydro accumulative horizons called arzyk-shokh (pedolytical) are formed in different depths of soil profile.

Ultimately, field studies of morphological features of soil must be completed with diagnosis of the individual horizons and determination of the type, sub type of the soil, what we have done. As a result, research in Central Ferghana determined that the investigated soils are a subtype of irrigated meadow-saz soils with arzyk-shokh (pedolytical) horizons, and are light loamy, average saline.

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## Form of membership of bugs hemiptera, which belong to the family miridae and their some biological properties in condition of Tashkent region

**Abstract:** In this article there were shown the form of the bugs Hemiptera, which belong to the family Miridae in condition of Tashkent region and their distribution in clover, cotton and wilding, the level of damage of the generative cotton organs (cotton bud, flower, cotton box) by the bugs.

**Keywords:** phytophage, type of membership, bug, clover, cotton, cotton box, flower, cotton bud, damage, deformation.

#### Introduction

The acceleration of the production in rural economy gave change of the level of negative influence of some known faunistic components to agroecosis and the emergence of new types. This in turn brings the expansion of the live area of blind bugs *Adelphocoris lineolatus* and *Lygus pratensis* and other types of bugs in cotton, the their damage area. Many terms of the family Miridae are phytophages

and they are pests of cotton, sugar beet, been foder floras, fibers of plants, pitch, tobacco, grain, fruit and vegetables, medicinal and ornamental plants [1; 3; 7].

The bug *Adelphocoris lineolatus* Goeze is the main pest of clover, it is established that the damage of clover, esparset, sebarga, nuts, peanuts and other been plants is about 27–63 %, in some case, it could be 90 %. It was determined this type of the bug in

general feed with plants about 140 types of 20 family and breeds by laying the eggs.

In result of damage of bugs phytophages to cotton the harvest of cotton was decreased about 11.2–47.6%.

The liquid of saliva of bugs influence to the lisi of plant tissue and brings the destruction of conductivity of metabolism and membrane. This brings the change of amount of monosaccharide, acidum ascorbinicum, chlorophiles and caratinoids at plant tissues, as a result of it develops such viral disease as the internal sliminess of cotton box in cotton, the disease of alternaioz, nigosporoz, bacteriosis in beans and potatoes, vertilloz in fodder plants.

The bugs of the family Miridae damage the different level of orthogenesis of cotton and it was established that the earlier damage of cotton brings the lag of its progress, desiccation, deformation, when it is damaged later. The deformation of the cotton occurs by the sticking of the bugs.

#### The materials and methods of research

The research occurred in farm “Mekhnat nur”, “Rustam agro”, “Elikuzi ota”, “Sayfulla ota”, “Ittifok” in the region Urtachirchik,

Bekobod, Zangiota of Tashkent. During the research the saved-up materials are analyzes in the “Etymology and mycology” laboratory of the institution of gene pool of the flora and animals world of academy of Science.

The bugs of the family Miridae were chosen as an object of the research. The bugs of the family Miridae, their type of structure and bioecological property are occur by A. N. Kirichenkos method.

#### The received results

During the research were registered 12 types of 6 generation of the bugs Hemiptea, which are belong into family *Miridae* in condition of Tashkent region, including 3 types of family *Adelphocori*, 3 types of family *Lygus*, 1 type of family *Camptobrochis*, 1 type of family *Trigonatylus*, 2 types of family *Campylomma*, 2 types of family *Polymerus* (Table 1).

In condition of Tashkent region there were established, that *Adelphocoris lineolatus*, *Lygus pratensis*, *Polymerus unifasciatus* were dominant in the field of clover, *Lygus pratensis*, *Campylomma verbasci*, *Campylomma diversicornis* in the field of cotton and *Lygus pratensis*, *Trigonatylus ruficornis* in the field of wilding (Table 2).

Table 1. – The type of structure of bugs, which belong to family *Miridae*

Family	Generation	Type
1. Miridae	1. <i>Adelphocoris</i>	1. <i>Adelphocoris lineolatus</i>
		2. <i>Adelphocoris jakovlevi</i>
		3. <i>Adelphocoris lineolatus var Implagiatus</i>
	2. <i>Lygus</i>	1. <i>Lygus pratensis</i>
		2. <i>Lygus gemellatus</i>
		3. <i>Lygus rugulipennis</i>
	3. <i>Camptobrochis</i>	1. <i>Camptobrochis punctulatus</i>
	4. <i>Trigonatylus</i>	1. <i>Trigonatylus ruficornis</i>
	5. <i>Campylomma</i>	1. <i>Campylomma verbasci</i>
		2. <i>Campylomma diversicornis</i>
	6. <i>Polymerus</i>	1. <i>Polymerus cognatus</i>
		2. <i>Polymerus vulneratus</i>

Table 2. – The level of distribution of the bugs Hemiptea, which belong to family *Miridae* in the cotton-clover agrocnois of Tashkent region

Generation	Type	The cotton field	The clover field	Wilding
1. <i>Adelphocoris</i>	1. <i>Adelphocoris lineolatus</i>	++	+++	++
	2. <i>Adelphocoris jakovlevi</i>	+	++	+
	3. <i>Lineolatus var Implagiatus</i>	+	+	+
2. <i>Lygus</i>	1. <i>Lygus pratensis</i>	+++	+++	+++
	2. <i>Lygus gemellatus</i>	++	++	++
	3. <i>Lygus rugulipennis</i>	++	++	++
3. <i>Campto-brochis</i>	1. <i>Camptobrochis punctulatus</i>	+	+	+
4. <i>Trigonatylus</i>	1. <i>Trigonatylus ruficornis</i>	+	++	+++
5. <i>Campy-lomma</i>	1. <i>Campylomma verbasci</i>	+++	++	+
	2. <i>Campylomma diversicornis</i>	+++	++	+
6. <i>Polymerus</i>	1. <i>Polymerus unifasciatus</i>	++	+++	+
	2. <i>Polymerus vulneratus</i>	+	+	+

The most spread types of the bugs Hemiptera, which belong to family Miridae, are *Adelphocoris lineolatus* and *Lygus pratensis* and they seriously damage the agrocnois of cotton and clover in condition of Tashkent region.

The lobby of shoulder of the bug *Adelphocoris lineolatus*, it has 2 points, the guard with 2 lines, colorless. The general color is brown-green. Some part of wings is black; there is a spot in the form of a sword in the center. The size of the bus is 7.5–9 mm. The clover bug winters in phase of eggs in the clover, ecsparcet and other bean fields. To fully progress of one generation of bugs the effective

temperature is 350°C on border 10°C. The damage of cotton with clover bugs brings the decrease of breathe intensity, activity of oxidizer enzymes of plants, the change of quantity of monosaccharide, ascorbic acid, chlorophyll, carotinoid on cotton leaves and considerable loss of a harvest.

The size body of adult *Lygus pratensis* bugs is about 5.8–7.3 mm. The color of its body is from yellow-green to reddish brown. There are 4 parallel black spots at a front part of the shoulder. The bug lays the eggs generally on the stalk of cotton leaves, the stalk of cotton bud and partially on the growing point of the plant.



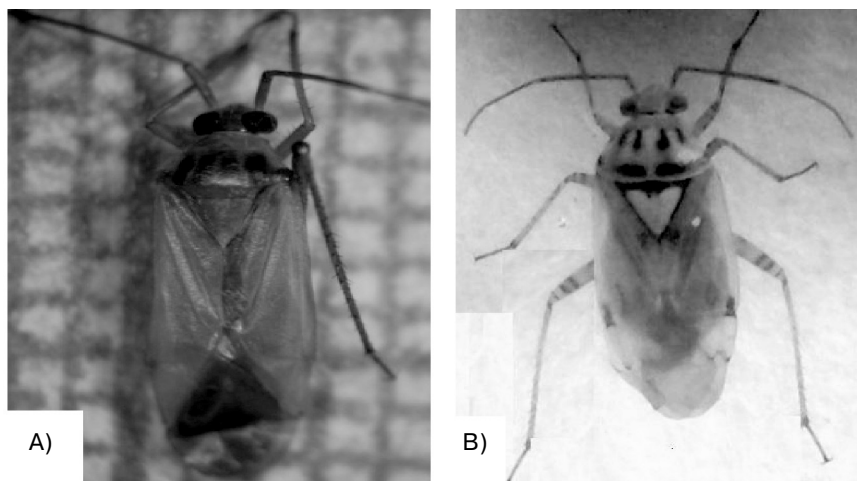


Fig. 1. The bugs, which belong to the family Miridae, widespread in Tashkent region: *Adelphocoris lineolatus* (A) and *Lygus pratensis* (B), (orig.)

The field bug in the period of its adult winters under the grass, the fallen leaves, it begins to fly in search of food when the air temperature reaches 16°C. After 9–12 days the female bugs leave autumn fields of crops for laying the eggs and gather on the jag-jag, surepka, sorrel and the other blossomed plants. The next generation of the bugs turns to cotton, when it has 10–12 real leaves. In this period the plant intensively growing prepares to have reproductive organs and during the season the bugs spawning progress in the cotton.

It was learned the damage of the generative organs of cotton (the sort of cotton “Namangan-77”), that is cotton bud, flower and cotton boxes, by the bugs which belong to family Miridae in the farm “Mekhnatnur” of the region Urtachirchik in Tashkent. The research was occurred considering generative organs of 5 models of the plants at the 20 points in the research fields (in general 50). According to obtained data it is established 40.5 % of cotton bud, 36.4 % of flowers, 60.4 % of cotton boxes damaged by the bugs of the family *Miridae* (Table 2).

Table 2. – Some rates of the damages of cotton harvest by the bugs of the family Miridae 05–20.08.2015 y. The sort of cotton “Namangan-77” in the farm “Mekhnatnur” of the region Urtachirchik in Tashkent

The elements of the harvest from 100 plants (from 20 points of calculate on 5 plants)									
Cotton bud			Flowers			Cotton boxes			
General	Damaged	%	General	Damaged	%	General	Damaged	%	
37	8	21.6	5	2	40.0	27	20	74.0	
23	8	34.7	7	4	57.1	41	16	39.0	
28	13	46.4	4	2	50.0	19	13	68.4	
35	8	22.8	4	1	25.0	9	6	66.6	
27	7	25.9	7	3	42.8	23	14	60.8	
23	9	39.1	6	3	50.0	24	19	79.1	
34	10	24.4	5	1	20.0	22	13	59.0	
33	10	30.3	5	1	20.0	22	14	63.6	
38	13	34.2	4	2	50.0	27	17	62.9	
17	12	70.5	4	1	25.0	30	20	66.6	
21	11	52.3	7	2	28.6	20	10	50.0	
12	4	33.3	4	1	25.0	37	20	54.0	
17	10	58.8	6	1	16.6	18	12	66.6	
16	11	68.7	4	1	25.0	28	16	57.1	
19	9	47.4	5	4	80.0	28	21	75.0	
14	8	57.1	5	1	20.0	16	11	68.7	
20	9	45	5	4	80.0	24	11	45.8	
23	8	34.7	5	1	20.0	17	12	70.5	
16	8	50.0	5	1	20.0	28	16	57.1	
50	12	24.0	6	2	33.3	22	13	59.0	
<b>On average</b>	25.1	9.4	40.5	5.1	1.9	36.4	24.1	14.7	60.4

The imago of the bugs and in all level of their progress, especially larvae at III–IV–V damage the plants seriously. On the surface of the generative organs damaged cotton appears a half drop juice of cotton in yellow color and then it becomes black. On the damaged places of the harvest elements there appear black spots. They may increase in the expense of several pricks around the spots. The cotton deformed. The damaged cotton boxes by bugs blossoms earlier (Fig. 2).

This situation influences negatively to the cotton fiber and the quality of their seed. Over time as a result of several pricks on a surface of incorrectly developing fabric there appears the crack and there is a hole. The semi-fluid juice of cotton — kamedy, which consists of large cage, follows through this hole. The interior of cotton box changes, the fabric and seeds collapse and turns into brown weight, which stuck with kamedy. If the harvest slug is damaged, they do not progress and dries.

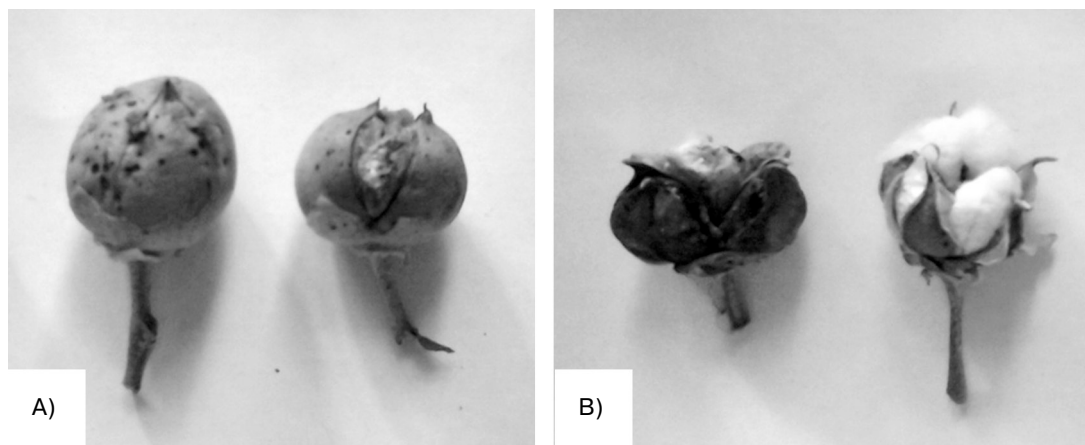


Fig. 2. The cotton which damaged by bugs of the family Miridae (A) and the harvest of cotton which grown on them (B) (orig.)

**Conclusion.** It was established 12 types of 6 generation of bugs, which belong to the family *Miridae* in condition of Tashkent region. It was reported that the types *Adelphocoris lineolatus*, *Lygus pratensis*, *Polymerus unifasciatus* in the clover field, the types *Lygus pratensis*,

*Campylomma verbasci*, *Campylomma diversicornis* in the cotton field and *Lygus pratensis*, *Trigonatylus ruficornis* in the wilding were dominant. It was determined the damage of cotton bud about 40.5%, flowers 36.4%, cotton boxes 60.4% by bugs.

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## Section 2. Geography

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### Regional structure and density of labour resources in Uzbekistan

**Abstract:** The purpose of this article is to present the regional location and density of population and labour resources of the Republic of Uzbekistan. More precisely, the article provides evaluations on the density of labour resources. The urban and rural location patterns of labour resources have been analyzed in the example of viloyats (regional provinces). Although, the statistical data from pre-independence period has been used in the article, main attention was directed at the period after 1991. Also, there is an effort to provide the analysis of the mutual effects between the formation of labour resources and demographic trends in recent years.

**Keywords:** Population, labour resources, regional structure of labour resources, density of population, growth rate of population, “demographic echo”, migration, the most active part of population.

It is a well-known fact that the reproduction of labour resources depends chiefly on demographic processes. A key role in the formation of labour resources is played by the growth and location patterns of labour resources, which are manifested through the total number of population, its growth rate, the difference in sex composition and the natural increase in population. But, at the same time, the impact of social and mechanical movement on the formation of labour resources should not be overlooked. Thus, birth, death, and the migration cause the change in age-sex structure and, as a result, determine the dynamics of labour resources. When researching the number, growth, composition, location and other indicators of labour resources, one must realize that they (labour resources), in the first place, are part of the population. Therefore, one should, first of all, research the population growth rate. In this regard, Uzbekistan stands out in CIS as a region with specific characteristics [2, 21].

According to the statistical data, the growth of population in the country accelerated in the second of the twentieth century. However, the process of decreasing birth rates which was taking place in all parts of the world could be observed in our republic as well. As a consequence, such changes in demographic processes were reflected in the growth rate of the total population. Thus, if it was 14.3 % between 1970 and 1979, then in the years 1989 through 2002 it shrank 1.5 times and became 9.1 %. Nevertheless, the birth rate of the population of our country has started to rise again since 2001–2002. This has been caused mainly by the increase in the number women of childbearing age; the decrease in the number of deaths, especially a sharp reduction in the number of deaths of mothers and infants under age 1; and the development of modern methods of medical services to the population. To be even more exact, the birth rate in the country is increasing thanks to the 1970s and 1980s generation who have been starting families and started having children. For it is a widely known fact that during that period the population of country was mainly made up of big families with 5 or more children. That is, such increase in birth rate was a result of something of a “demographic echo”.

Increase in birth rate can be observed in all parts of the country, but some regions stand out as they have higher birth rate than the national average (23.5 %). Kashkadarya (25.6 %) and Surkhandarya (25.7 %) are good examples of such regions. At the same time, the city of Tashkent (17.9 %), Tashkent region, Bukhara and Navoi regions have the lowest birth rate in the country [13].

A significant role in the change of number of population is played not only by its natural movement but also by its mechanical movement. As we all know, migration is a movement of people from one place to another because of the change in their permanent or temporary residence and jobs. As a result of migration we can observe the change in the number and composition of population, as well as the change in the formation of labour resources.

The flow of migration affects both the production potential of the regions and accumulation of the population in one region or another. For, such accumulation of population causes the increase in population density and this process is certainly comes as a result of the mechanical movements [1, 36].

In the beginning of 2016 the population density in the republic is 70 people per sq. km., but that number differs from region to region. For example, if in Andijan it is 650 people per sq. km, then in Navoi region it is a mere 8 people per sq. km.

The big difference between the lower and higher ends of population density of our country gives us a chance to study the population density by diving it into several groups. Thus, the regions with the population density of up to 20–25 people per sq. km, such as Republic of Karakalpakstan and Navoi region should be researched separately and the regions with population density of 200 or more people per sq. km. (Andijan, Khorezm, Fergana, Namangan) should be studied with special attention. However, if we want to have an even more detailed analysis of population density, we can use the method recommended by Tadjiyeva Z. N., the prominent scientist in demography, who divided the regions into 5 groups when studying the population density [13, 70].

Above-mentioned division of regions is also very important in determining the socio-economic situation and development of those

regions. The increase in the number and density of population leads to the shrinking of land and especially irrigated land per capita. Furthermore, it creates such problems as providing the population with housing and creating jobs for those people. When looking at the issue from this angle, it is utterly important to analyze the formation and growth of labour resources in certain regions. Because as it was stated many times, Uzbekistan is a country with a high rate of formation of labour resources (table 1). In our opinion, the growing rate of this category of population in the years of independence should be studied by dividing it into following time periods: 1991–1996, 1996–2001, 2001–2006, 2006–2010 and 2010–2015. If the total number of newly formed labour resources was 1,162,000 at the end of the first period, or in other words 232,000 per year, then the growth during the second period was 288,000 people per year; during the third period — 399,000 people per year. After this, the growth rate started to fall and the labour resources were joined by 382,000 people per year during the fourth period and 310,000 people per year during the fifth period. Such increase in the number of labour resources is happening, first of all, due to the change in its demographic base.

Table 1. – Dynamics of growth of the labour resources in the years of independence of the Republic of Uzbekistan (in thou. people)

Years	1991	1996	2001	2006	2010	2015
Labour resources	10213	113756	12817	14817	16726	18277

\* The table was prepared by the author based on the data of the State statistics committee.

Additionally, the increase in the people who are not part of able-bodied population but still want to act as regular labour resources also affecting the number of labour resources in general. However, the fact that the lowest level of birth rate in the country was in the years 2000–2001 (at this period the annual number of births was around 500,000, which is the lowest number in the years of independence. In 2015, for example, that number reached 718,000 [6.4]) was the main reason for the decline in the number of labour resources at the end of the fifth period. That is, the current level of birth rate serves as the primary base for the labour resources that will be formed after 15–16 years.

The structure of regional labour resources and the changes that are occurring in them vary significantly from region to region. That

happens due to the level of natural-climatic and socio-economic development of those regions. Furthermore, the size of the territorial units of the country (just like population density) affects the location and density of labour resource in a special way. For instance, the average density of labour resources in the country is 40 people per sq.km. but in a small Andijan region this number is over 370. On the other hand, because of its big size Navoi region has a labour resources density of only 5 people per sq.km. Labour resources of certain area and the level of job supply affect indirectly their dynamics of growth. For example, if in the first years of independence Tashkent accounted for 13% of all labour resources in the country, today that number dropped to 9% (fig. 1). This was the result of 1) earlier formation of urban lifestyle in this region and a serious drop in birth rate, 2) limitations on the building of major production facilities in the city and also the termination of registration of labour resources that come to the city from other regions of the country. Similar situation could be observed in Navoi, Sirdarya and Republic of Karakalpakstan where there is a downward tendency. In such regions as Fergana, Samarkand, Andijan and Kashkadarya one can see a different, upward movement, where the share of total labour resources is growing. This is especially true for Kashkadarya, which saw a biggest growth of 1.4 points. The shares of such regions as Samarkand (0.9 points) and Namangan (0.8 points) have also been growing.

If we pay a closer attention to the regional (urban, rural) proportions of labour resources, then we can see that out of total 18,227,000 labour resources almost 55% live in the cities, as opposed to 45% that reside in rural areas. However, until recently, for example in 2001, only 40% of all labour resources lived and worked in urban areas. The reasons for such transformations are the following: governmental decree on the changing status of urban and rural inhabited areas; the desire of workers, who make up a major part of labour resources, to move to jobs that are in cities; moving closer to the workplace (and to consumers) because of the rise in transportation costs.

Additionally, in recent years the formation and development of various branches of production has been going at a greater pace in cities than in rural areas. Nevertheless, the introduction of industry to the villages and a rapid development of social infrastructure in rural areas could cause a normalization of proportions in regional location of labour resources.

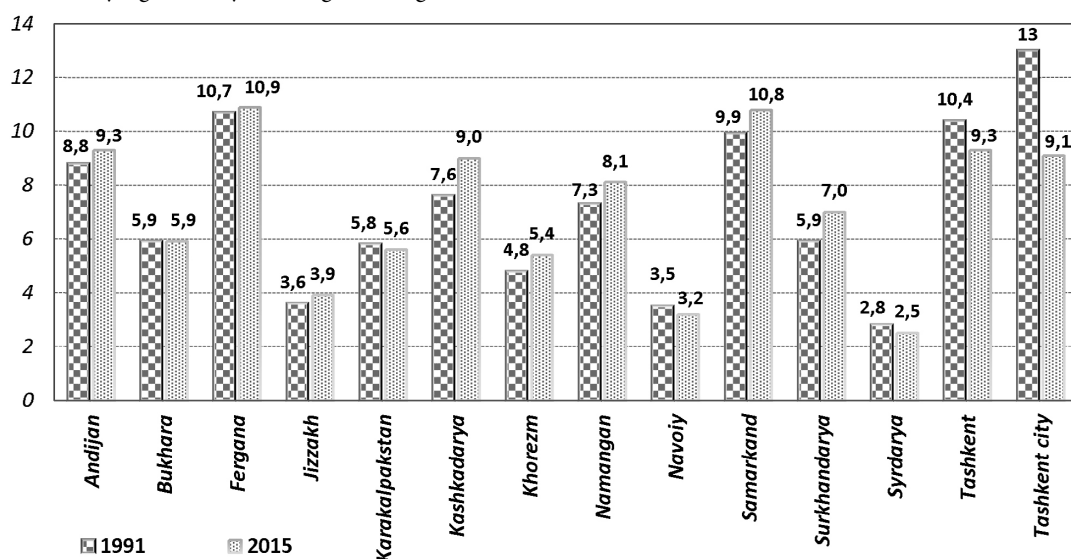


Fig. 1. Changes in the regional structure of labour resources in Uzbekistan (At the beginning of the year, in percent)

\* The figure was prepared by the author based on the data of the State statistics committee.

By paying a closer attention to the situation of regional location of labour resources in regions, one can study them by dividing them into two groups. In the first group we have regions with more labour resource located in cities than in rural areas (table 2).

For instance, in Namangan, 67% of labour resources live and work in the cities and only 33% does the same in villages. Similarly, Andijan, Fergana, Navoi, Jizzakh regions are also considered as places with more urban labour resources. Khorezm, on the other hand, is a region that has more rural labour resources — 63% of la-

bour resources there live in rural areas. We can also add Samarkand, Surkhandarya, Sirdarya and Kashkadarya regions to this group.

As a conclusion, we would like to note that the annual growth of labour resources in our country is 400,000 people that constitute 1.3% of total population or 2.2% of total number of labour resources. The existing demographic pace allows us to believe that the above-mentioned rate will not change in the near future. Because, the main cause of the growth of labour resource in our country is demographic processes.

Table 2. – Regional structure of labour resources (in percent)

№	Regions	Urban labour resources	Rural labour resources
1.	Andijan	55	45
2.	Bukhara	41	59
3.	Fergana	61	39
4.	Jizzakh	52	48
5.	Republic of Karakalpakstan	51	49
6.	Kashkadarya	47	53
7.	Khorezm	37	63
8.	Namangan	67	33
9.	Navoi	55	45
10.	Samarkand	40	60
11.	Surkhandarya	40	60
12.	Syrdarya	43	57
13.	Tashkent	52	48
14.	Tashkent city	100	–
15.	Total of Uzbekistan	55	45

\* The table was prepared by the author based on the data of the State statistics committee.

Regional location of labour resources, just as the general population, is distributed unevenly throughout the republic. Majority of labour resources that are being formed in regions are demonstrating a desire to work in cities. In the regions with densely populated with and rapid formation of labour resources the number of labour migrants is growing. The main participants of internal migration in our country are the able-bodied part of population; especially young people aged 18–29 (who are, economically, the

most active part of population). Their movement is directed toward big cities from densely populated areas. Today we a situation where both birth rate and the number of population is on the rise. And such situation requires that the local authorities deal with problems that come with the formation of labour resources, such as balancing of job creation and formation of labour resources. In order to handle these tasks several scientific proposals and recommendations need to be developed.

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## Section 3. Information technology

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### Extracting the hidden regularities on latent features by using interval methods in pattern recognition problems

**Abstract:** In this article is offered the numerical algorithm for selecting optimal boundaries of intervals of feature values of classified objects. The algorithm is invariant to the scale of measurement, it can be used on searching for latent (obviously not measurable) features in databases to modeling of intuitive decision-making process.

**Keywords:** partition into intervals, the optimal values of interval boundaries, estimation of complexity of the algorithm.

#### Intruduction

Partition to intervals for values of the quantitative features is widely applied in different algorithms of data analysis. Usually, in applied statistics the value of quantitative features divide into equal intervals, where the number of intervals given in advance. The task of partitioning to intervals was considered in the theory of pattern recognition with supervised learning [5, 2–3].

Using numerical optimization methods allow to select the parameters of the model, in which recognition algorithms allow the least number of errors on a given training set. Increasing the complexity of the model is not always good, as “optimal” algorithms are starting to well adapt to the specific data, including a measurement of the training data and the error of the model.

The model’s complexity in the theory of artificial neural network (ANN) is expressed in the term of generalization ability. It is required that the ANN algorithms solve not only the supervised problems, but also able to take a good decision on the objects where have not seen in the process of training. The development of new methods of data mining serve to these goals, which allows to obtain new knowledge about the problem and use them, and also to improve the accuracy of ANN algorithms for any admissible objects [3, 2–4].

In [3, 3–5] the task of splitting into intervals of feature values of classified objects is formulated as deterministic. Checking the following hypothesis is the base of criterion of a method: “There is a partition, where each interval contains all the feature values for the same class objects”. Obviously, the number of intervals must be equal to the number of classes. The truth of the hypothesis is proved through the computational experiment.

Described algorithm in the article is invariant to the scale of measurement, it can be use for:

- searching for latent (obviously not measurable) features in databases for modeling of intuitive decision-making process;
- extracting the set of informative features with different types.

It is offered the preprocessing of data to reduce the number of calculations.

#### Statement of the problem

We consider the problem of recognition in the standard formulation. It is believed that given a set of objects  $E_0 = \{S_1, \dots, S_m\}$  containing representatives  $l$  disjoint classes  $K_1, \dots, K_l$ . Description of objects is performed using a set of  $n$  quantitative features  $X_n = (x_1, \dots, x_n)$ .

It is required that splitting the quantitative features into intervals by two criteria and comparing the results.

To solve this problem, it is used following expression to split the quantitative features into domination intervals as a first criterion [4, 10–12].

$$\frac{d_t(u, v)}{|E_0 \cap K_t|} - \frac{\overline{d_t(u, v)}}{|E_0 \cap CK_t|} \rightarrow \max_{\Omega}. \quad (1)$$

In this criterion  $(u, v)$  — domination interval,  $d_t(u, v)$  — the number of objects which belong to  $t$  th class in  $[u \dots v]$  interval;  $K_t$  — the number of objects which belongs to  $t$  th class in a given data,  $t = 1, l$ . This criterion becomes maximum when the same class objects are located in each interval. It is found the values of membership function in the following formula:

$$f_{ci} = \frac{d_1(u, v)}{|K_1|} / \left( \frac{d_1(u, v)}{|K_1|} + \frac{d_2(u, v)}{|K_2|} \right). \quad (1')$$

It is recommended to use (1'') to find out the stability on the help of (1').

$$g_c = \frac{1}{m} \sum_{\{[u, v], \mathbb{I}\}} \begin{cases} f_{ci}(v-u+1), & f_{ci} > 0.5, \\ (1-f_{ci})(v-u+1), & f_{ci} < 0.5, \end{cases} \quad (1'')$$

Stability becomes in  $[0.5 \dots 1]$  interval.

It is used following expression to split the quantitative features into intervals according to the number of classes as a second criterion [4, 40–42].

$x_j, j \in I$  ordered set of feature values is divided into two disjoint intervals  $[c_1, c_2], [c_2, c_3]$ . The criterion for determining the boundaries based on compactness hypothesis, where each interval contains the feature values from one class objects only.

$$\left( \frac{\sum_{i=1}^2 u_i^1 (u_i^1 - 1) + u_i^2 (u_i^2 - 1)}{\sum_{i=1}^2 |K_i| (|K_i| - 1)} \right) \left( \frac{\sum_{d=1}^2 \sum_{i=1}^2 u_i^d (|K_{3-d}| - u_{3-i}^d)}{2|K_1||K_2|} \right) \rightarrow \max_{\{A\}}. \quad (2)$$

It allows us to calculate the optimal value of the boundaries between the intervals  $[c_1, c_2], [c_2, c_3]$  and use it to determine the gradation of the quantitative features in a nominal scale of measurement. The expression on the left bracket is intraclass similarity, on the right — interclass difference.

$u_i^1, u_i^2$  — the number of features which belongs to  $K_i, i = 1, 2$  class in  $[c_1, c_2], [c_2, c_3]$  intervals.  $K_i, i = 1, 2$  — the number of objects belongs to  $i$  th class in a given data. It is checked the compactness hypothesis through this criterion.

It is offered to use the preprocessing through the constructing of D matrix to decrease the complexity of the algorithm. The meaning of preprocessing is to formalize as  $r_{j_1}, \dots, r_{j_m}$  ordered sequence the integer value matrix.

The elements of the D matrix is calculated as:

$$D = \begin{pmatrix} d_{10} d_{11} \dots d_{1m} \\ \dots \dots \dots \\ d_{p0} d_{p1} \dots d_{pm} \end{pmatrix},$$

$$d_{pi} = \begin{cases} 0, & i = 0, \\ d_{p,i-1} + g(p, i), & i > 0, \end{cases}$$

where:  $g(p, i) = \begin{cases} 1, & S \in K_p, \\ 0, & S \notin K_p. \end{cases}$

Here, index of  $d_{pi}, p = \overline{1, l}, i = \overline{1, m}$  element's column corresponds to the value of  $r_{ji}$  feature which belongs to  $S \in E_0$ .

**Computational experiment**

To illustrate the process visualization objects was used "Gipertaniya" [1, 2–3] data (which is taken from medicine fields). The set is represented 147 objects with 29 quantitative features. Objects are divided into two disjoint classes, K1 (healy people), K2 (ill people). Results of splitting some features into domination intervals according to (1) are presented in table 1. Results of splitting some features into intervals according to (2) are presented in table 2.

Table 1. – Splitting some features into domination intervals according to (1)

Name of feature	Domination intervals	Stability
Blood pressure (high)	[90 ... 140]	0.97
	[150 ... 220]	
Blood pressure (low)	[60 ... 80]	0.94
	[85 ... 130]	
RR interval	[0.6 ... 0.7]	0.81
	[0.72 ... 0.88]	
	[0.9 ... 0.1]	
	[1.04 ... 1.08]	
	[1.12 ... 1.28]	
Age	[17 ... 42]	0.88
	[43 ... 80]	

Table 2. – Splitting some features into intervals according to (2)

Name of feature	Intervals	Stability
Blood pressure (high)	[90 ... 140]	0.93
	[150 ... 220]	
Blood pressure (low)	[60 ... 80]	0.91
	[85 ... 130]	
RR interval	[0.6 ... 0.76]	0.25
	[0.78 ... 1.28]	
Age	[17 ... 45]	0.61
	[46 ... 80]	

**Conclusion**

As we can see in above tables, the feature "Blood pressure (high)" was split into two intervals according to (1) and (2) with 0.97 and 0.93 stabilities respectively. So it was considered as a good feature. The feature "Blood pressure (low)" was also split into two intervals in both criterions and had almost the same stabilities. The feature "RRinterval" was split into 5 domination intervals, its stability was 0.81 according to (1) and this feature was split into 2 intervals according to (2) with 0.25 stability. Although the feature "RRinterval" was split into 5 domination intervals by (1), its stability was better than the stability taken from (2). The feature "Age" was also split into two intervals in both creterions. This feature's stability by (1) was greater than by (2). As for results it is recommended to use first criterion in "Gipertaniya" data.

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## Section 4. Mathematics

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### Integral formula for the Newton's (m, n) nominal

**Abstract:** A new method is proposed for construction of variables degrees amounts by integrating. It is shown that in many cases it can compete with the use of the binomial theorem.

**Keywords:** binomial theorem, the integration of the binomial.

The classical formula of the Newton's binomial is the construction of the sum of two arbitrary numbers in degree  $n$  and its has the form:

$$(a+b)^n = \sum_{k=0}^n C_n^k a^{n-k} \cdot b^k, \quad (1)$$

where  $C_n^k = n! / (k!(n-k)!)$  is a binomial coefficient. There are in (1)  $2^n$  terms, and nonrecurring —  $(n+1)$  terms. Under the Newton's  $(m, n)$  nominal we understand the amount of:

$$\left( \sum_{k=1}^m a_k \right)^n = \sum_{k=1}^m a_k^n + \sum_{k=1}^m \prod_{k=1}^m a_k^k, \quad (2)$$

where  $\sum_{k=1}^m t_k = n$ . This indicates the homogeneity of functions of dimension  $n$ . The total amount of members right there  $m^n$  integres. Squaring the sum of  $m$  numbers has a simple formula. This is the sum of the squares of the terms plus twice the product of different terms. There is only  $(m(m+1)/2)$  non-repetitive combinations. If  $m \geq 3$ , the modern educational and reference [1; 2] proposes to disclose the amount (2) gradually through Newton's binomial, which is very cumbersome. For example,

$$(a+b+c)^3 = a^3 + b^3 + c^3 + 3(a^2b + ab^2 + a^2c + ac^2 + c^2b + cb^2) + 6abc. \quad (3)$$

We propose an alternative integrated version of the calculation Newton's  $(m, n)$  nominal. First, let us formulate a general rule the taking of the integral. Let:

$$N(n, m) \equiv \left( \sum_{k=1}^m a_k \right)^n = F_1(a_1) + F_2(a_2) + \dots + F_m(a_m), \quad (4)$$

where  $F_1(a_1)$  — the sum of all summands containing a number  $a_1$ ,  $F_2(a_2)$  — the sum of all other summands do not contain the number of  $a_1$ , and so on. Thus  $F_m(a_m)$  one term  $a_m^n$ . For example, in (3)  $F_2(b) = b^3 + c^3 + 3(c^2b + cb^2)$ . After this split Newton's  $(m; n)$  nominal the following degrees, i. e. Newton's  $(m; n+1)$  nominal, through the integrals written as:

$$\left( \sum_{k=1}^m a_k \right)^{n+1} = (n+1) \left\{ \int_0^{a_1} N(n, m) da_1 + \int_0^{a_2} F_2 da_2 + \int_0^{a_3} F_3 da_3 \dots \right\} + a_m^{n+1}. \quad (5)$$

We show the validity of formula (5) by the binomial theorem.

$$1. (a+b)^2 = 2 \left\{ \int_0^a (a+b) da + \int_0^b b db \right\} = a^2 + 2ab + b^2.$$

$$2. (a+b)^3 = 3 \left\{ \int_0^a (a^2 + 2ab + b^2) da + \int_0^b b^2 db \right\} = a^3 + 3a^2b + 3b^2a + b^3.$$

$$3. (a+b+c)^3 = 3 \left\{ \int_0^a (a^2 + b^2 + c^2 + 2(ab + ac + bc)) da + \int_0^b (b^2 + c^2 + 2bc) db + \int_0^c c^2 db \right\} = a^3 + b^3 + c^3 + 3(a^2b + ab^2 + a^2c + ac^2 + c^2b + cb^2) + 6abc.$$

Therefore, the formula (5) allows us to consistently increase the degree  $n$  of the sum  $m$  numbers, and the same term is already sorted and not repeated. The resulting coefficients are already equal to the product of binomial coefficients. For example, the number "6" in the third example is  $(C_3^1 \cdot C_2^1)$ .

The meaning of integration is to reduce basic operations. In the example 1:  $(a+b)^2 = (a+b)(a+b)$  requires four operations, and the integration used only three. Any squared  $\left( \sum_{k=1}^m a_k \right)^2$  requires  $m^2$ , and integrating formally  $(m(m+1)/2)$  operations. In fact, such operations while integrating even less. The fact that Newton's  $(m, n)$  nominal function of the homogeneous and the number of sets of degrees  $t_k$  limited. For example, when  $m=3$  and  $n=5$  possible such structures:  $x^5; x^4y; x^3y^2; x^2y^2; x^3yz$  for cyclic permutation of the variables. Therefore, it is sufficient to take only the first integral in (5)  $a_1$  and in it to allocate separate different combinations of powers. The numerical coefficient in front of this term go into a general formula. The following components are found by cyclic substitution.

Suppose you need to find  $(a+b+c)^4$ . From the example 3 calculated:

$$4 \int_0^a (a+b+c)^3 da \rightarrow \{a^4; 4b^3a; 12a^2bc; 6a^2c^2\}. \quad (6)$$

Making in (6) a cyclic change of variables, we get:

$$(a+b+c)^4 = a^4 + b^4 + c^4 + 4(ab^3 + ac^3 + cb^3 + bc^3 + ba^3 + ca^3) + 12(a^2bc + b^2ac + c^2ba) + 6(a^2b^2 + a^2c^2 + c^2b^2).$$

In the direct product would be required "81" operations, we used the "4" operation of integration. The most important thing is that the numerical multipliers to different groups of factors are immediately.

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## Section 5. Materials Science

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### Implementation of technology production of composite tools of super-hard materials

**Abstract:** In the article provided information on super-hard materials composite tools production technology. Based on powder metallurgy result of research works created superhard composite of diamond material intended to equip the tool for various purposes is operated in conditions of intense abrasive effect and significant dynamic loads.

**Keywords:** super-hard materials, diamond, powder materials, hard alloy cutting and shaping tools.

#### Introduction

Scientific and technical progress, increasing of labor productivity, improve product quality, reduce production costs, save labor and material resources to a large extent depends on the use of composite materials containing synthetic super-hard materials in combination with metals and alloys.

As a result of research works created superhard composite of diamond material intended to equip the tool for various purposes is operated in conditions of intense abrasive effect and significant dynamic loads. The materials in this class are tvesal — is a composition of fine powders of synthetic diamond, orderly distributed in the tungsten carbide group – based material.

#### Objects and methods of research

Super-hard composite of diamond tool material manufactured by powder metallurgy. This method has broad possibilities for the formation of specific, predetermined properties. Manufacturers super-hard composite materials of diamond tools for different purposes a lot of attention is paid to the preparation and processing of diamond raw material, preparing a powder charge, the patterns of distribution of diamonds since the volume of the cutting element, the consolidation of the structural elements to form lasting contacts between them. Typical, a solid diamond grains. Robust single crystals of synthetic diamonds are selected when they are sorted according to their magnetic properties and are classified according to the shape and roughness of the surface.

Synthetic diamonds are sorted, using the flotation separation of grains containing less than 0.2% impurities. Also, there sonication in molten salts, which are destroyed thermally unstable grains.

The process of preparing the diamond grains comprises degreasing the surface and applying to them the metal coating. A method for carburizing coatings to incomplete saturation.

For the production of super-hard composite of diamond content tool material mixture used carbide powders with alloying elements. Prepare batch mixers in a system such as “drunken” barrel.

Used to form the blend of the non-working items super-hard composite of diamond content tool material, granulated. For this carbide mixture is mixed in a screw mixer with a 12% a solution of synthetic rubber in gasoline. Prepared charge after drying rubbed over the net on the shaker.

For obtaining products of super-hard composite tool material of diamond content predetermined configuration and dimensions using graphite mold. Graphite form largely determine the complexity of manufacturing tools and the stability of its properties. The use of graphite due to its high strength and production of super-hard composite of diamond instrumental material used graphite brand EG-0.

Molding is the charge on the sample packaging, consistent filling them in the mold and cold pressing.

The sintering process carried out in a hydrogen environment, a two-zone furnace with a graphite heater. The temperature and duration of heating should exclude complete carburization of tungsten carbide to the stoichiometric composition.

The principal difference between super-hard composite materials of diamond content of diamond tools is that the destruction of the material is due to the simultaneous action of both diamond and carbide matrix. Carbide forming crimped “bed”, promoting diamonds with stand heavy dynamic loads.

Planned studies will be used to study the method of powder metallurgy to create super-hard composite of diamond content tool material, which can not only be used directly powder metallurgy method by which to obtain a wear-resistant, shock-resistant structure that will make it possible to use this method:

- Industry;
- Mechanical engineering.

The purpose of the study of the theoretical foundations of the possibility of creating composite super-hard of diamond content tool material for cutting tools by powder metallurgy.

#### Scientific results and their analysis

A compound in a single composition on the properties of two different tool materials makes possible entrainment tool life — 32 times in working conditions of intensive wear and considerable dynamic loads.

The reliability and performance of cutting tools are determined, mainly, the state of the cutting part is the most wear out quickly. Increased durability of the cutting elements of tools is one of the basic and effective ways to increase resource performance. This would improve the quality of the tools is guaranteed, and at the same time, the need to cover the industry of the Republic of Uzbekistan due to increased longevity.

Scientific work is provided to analyze and develop the creation of super-hard composite of diamond content tool material by powder metallurgy for metal-cutting tools, unparalleled in practice. It is, first of all, it is necessary for the machine-building industry of the Republic of Uzbekistan.

The basic idea is presented, proved at appropriate scientific conferences and publications. However, its specific solutions require analytical work on the improvement of progress suggested in the patent applications and publications on this topic.

Proposed project, which includes innovative investment solutions and production and economic issues the engineering industry in the use of new methods of obtaining metal-cutting tools.

The results can be applied to other fields of industry for the production of any requiring increase hardness and wear resistance of tools.

To accomplish this work there is a good reason: a number of completed and protected at conferences of scientific papers on the subject. This line of work has no analogues in the near and far abroad.

To perform the work on this direction has the necessary conditions: the scientific and technical personnel, material-technical base of the Faculty of Mechanics at the Tashkent State Technical University, the necessary office equipment, communication with the scientific schools in the near and far abroad.

Analysis of the results showed that the component life is increased by 2–3 times.

Thus, at this point the following practical results were obtained:

- theoretical analysis of the process of formation in particles super-hard composite of diamond content tool material;
- enter improvements in plasma-chemical plant by the use of a new type of reactor, resulting in improved performance. The morphology and structure of ultrafine tungsten powders. It is shown that powders of ultrafine micro distorted levels 2–3 times higher than standard;
- researched effect of annealing temperature on the hydrogen and vacuum structure and phase composition of powders and their subsequent reactivity. Proposed thermal treatment regimes for passivation powders;
- questions of structural dynamics, realogy and macro kinetics sintering of fine particles;

- proposed pressing and sintering carbide mixtures modes and tools, made on the basis of super-hard composite of diamond content instrumental material.

The objective is to create a diamond-bearing material allowing expand the range of its application by varying its composition and properties, such as strength, hardness, wear resistance and other mechanical properties, as well as the method makes it relatively easy to obtain such material.

Catalytic synthesis method at high static pressures and temperatures of the hexagonal graphite phase (C) (fig. 1) small particles of synthetic diamond cubic phase were obtained (fig. 2).

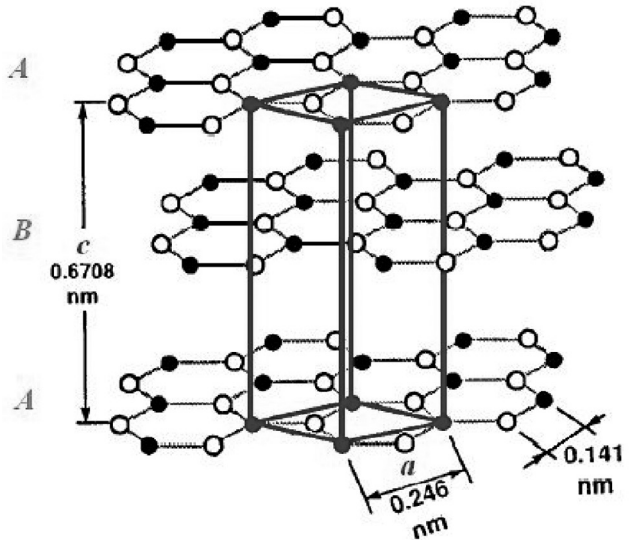


Fig. 1. Graphite hexagonal

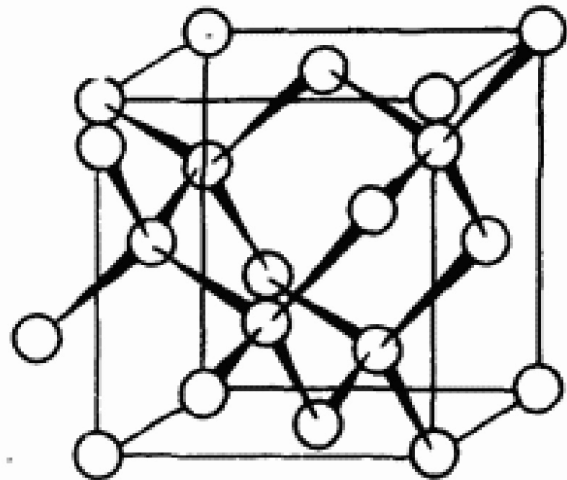


Fig. 2. Nitride crystal lattice

Color from black to white. Depending on the manufacturing technology synthetic diamond can be translucent or opaque. For the same boron and nitrogen technology is received modification of boron nitride BN, on the structure and properties resembling synthetic diamond. The crystal lattice — cubic, hardness is slightly lower than that of diamond, but still very high: 40–45 GPa., i.e. more than twice higher than that of hard alloys, and almost twice as high hardness cutting ceramics... Polycrystalline cubic boron nitride (PCBN) is sometimes called “Borazon” “cubanite”, “Borazon”. Modulus boron nitride at  $E = 700\text{--}800$  GPa., compressive strength approximately same as that of hard alloys:  $b = 2.5\text{--}5$  GPa. and lower than that of hard alloys and polycrystalline diamond, tensile strength bending:  $s\text{ bend} = 0.6\text{--}0.8$  GPa.

Heat stability of cubic boron nitride is much higher than that of synthetic and natural diamonds: about 1000–1100 °C. For this reason, and also in connection with less chemical affinity to carbon, cubic boron nitride is more effective than diamond and hard alloys for finishing machining steel, especially of hardened steels at cutting of high hardness and small sections of the shear layer.

From diamond micro powder brand ACM 28/20 (GOST 9206-80) preparing the charge. To this end, diamond powder binder is added — 20–25 % alcohol solution of phenol formaldehyde resin brand SF-010-A (GOST 18094-80) in an amount of 2–4 wt. % dry resin of the mass of diamond powder. The charge was thoroughly mixed and triturated twice through a sieve of 0.25–0.30 mm. cell.

Forming sample 20–25 mm. in diameter and 2.3 mm. high compression is performed using a batch test portions of the metal mold. A weighed sample is placed in a mold and molded at room temperature with a force of 40–45 kN. Forming removed further from the mold and allowed to stand in air at room temperature for 10 hours and then dried at 70 °C for 1 hour and claim at 150 °C for 1 hour. The thus obtained preform comprises 98 mas. % of diamond and has a porosity of 47 vol. %.

The heat treatment is carried out blank in a vacuum (pressure — 0.1 mm. Hg.), 1550–1600 °C at temperature for 4 min. Such heat treatment conditions allow graphitize diamond particles of 14 wt. %.

The impregnation is carried out semi silicon alloy — titanium, containing 12 wt. % Titanium. The impregnation is carried out by melting the alloy on the surface of said semi-finished product when 1550–1600 °C.

The result is a product, a tablet diameter and 20–25 mm. in height of 2–3 mm. of diamond material, wherein the diamond grains linked matrix comprising silicon carbide, titanium carbide and silicon alloy — titanium (titanium silicide).

Comparative testing of samples for wear treatment of APC-diamond wheel 150 × 20 × 32 without coolant showed that the samples have a wear resistance substantially equal to the wear resistance of the samples is similar, but which used to impregnate the pure silicon (the known technical solution). The flexural strength of the material obtained, measured by a biaxial flexure 15–20 % above known material not containing titanium compounds.

Thus, the implementation of the claimed method makes it relatively easy to obtain diamond-bearing materials in the form of complex parts and large size. The use of silicon alloys provides an intensification of the process semi-impregnation. Thus, due to the introduction of the additional material of other compounds formed during the implementation of the method, the materials obtained have wider field of use by allowing for selection of optimal formulations erosion and abrasion resistance. Furthermore, the presence of material adhesively-active metal soldering facilitates the manufacture of the tool, and increases the durability of the tools in two times in comparison with analogues.

A comparative study of the mechanical properties of tools for different purposes, made from standard powders and mixes with super-hard composite diamond content instrumental material.

Calculations showed that the expected economic benefit from the implementation of instruments made with super-hard composite diamond content tool material is 400 million sum per year.

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## Section 6. Medical science

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### The new features of in vitro allergodiagnosics of food allergy in hot climate conditions

**Abstract:** We implemented immunoblotting panels of allergens into clinical practice for diagnosis of food allergy and cross-reactions to food, pollen, fungi and latex. These panels are widely used in the republican allergy center, allergy departments of Khorezm, Bukhara, Surkhandarya, Kashkadarya, and also in clinical centers of Samarkand and Andijan regions.

**Keywords:** Food allergy, allergenic proteins, allergenic foodstuff, diet therapy.

#### Introduction

There is presently a tendency to an increasing frequency of allergic diseases. About 30 % of the world's population suffers from various forms of allergy [2; 3].

Currently, there is no accurate food allergy prevalence data for our country. On the one hand, this is due to numerous disease manifestations that affect many organs and systems. On the other hand, this is connected with difficulties with accurate diagnosis verification in clinic practice. There are approximately 220–250 million people suffering from allergy diseases [11].

The objective of our study was an examination of the food allergy diet therapy in a view of food properties sensitizing by “in vitro” methods.

#### Material and methods

We have introduced “Rida qLine” allergy panels (R-Biopharm, Germany) to the republican allergy center, allergy departments of Khorezm, Bukhara, Surkhandarya, Kashkadarya and in clinical centers of Samarkand and Andijan regions for food allergy and cross-reactions to food, pollen, fungi and latex diagnosis. This test is based on the principle of immunoassay on a nitrocellulose membrane (immunoblot) for a quantitative determination of allergen's specific IgE antibodies of the patient's serum and plasma. The allergens that correspond to the panel composition are applied to the surface of nitrocellulose membranes. Results are expressed in IU/ml and RAST (radioallergosorbent test) classes (0–6). There are four different panels. All results with IgE greater than 0.35 IU/ml were considered to be positive. Food panels contain the most common in our region food allergens and their mixes.

#### Results and discussion

Allergy diagnosis is difficult due to the lack of uniform methodological approaches and diagnosis methods that allow to identify allergy development mechanisms. In pseudo allergic reactions, it is impossible to detect specific antibodies that participate in true allergic reactions. The reaction is dose dependent, and unlike to allergic reactions, pseudo allergic reactions invoke during the first contact [4].

Taking into account climatic- geographical features and food traditions of the population, we suggested another allergens panel composition for our country. This composition consists of 2 types of food allergens, children and mixed allergen panels. Every panel has 20 allergens and 5 standards. All standards are calibrated by the reference to international protocols «1<sup>st</sup> WHO IRP 67/86 for

human IgE». The results are expressed in IU/ml (0–100 IU/ml) and in RAST classes (0–6).

In immunoblot panels we included typical for our region food products (strawberry, lemon, peach, cow's milk, egg, tomato, pea, peanut, carrot, walnut, honey, chicken meat, beef, mutton, horse-meat, cherry, wheat flour, oak flour, buckwheat flour, banana, yogurt, gluten, mixtures of nuts, fruit, vegetables, meat, legumes), epidemical (bovine serum albumin, animals' epithelium, plumage), fungi (*Cladosporiumherbarum*, *Penicilliumnotatum*, *Candida albicans*, *Alternariaalternata*, смеси *Aspergilli*, *Mucormucedo*, *Rhizopusnigricans*), professional (latex) and pollen (tree pollen, meadow pollen, weeds pollen) allergens.

We tested the blood of 65 children at the age under 18 by the use of a pediatric panel and 32 adults at the age from 18 to 60 by the use of a food panel. According to our research results, the most allergic food products in a hot climate conditions among children are buckwheat flour in 26.1 % cases; gluten — 24.6 %; nuts, wheat flour — 16.9 %; rice, yogurt — 13.8 %; cow's milk — 12.3 %; eggs — 10.7 %; oat flour — 4.6 %. 23.1 % of patients under 18 had reaginic antibodies E to a grass mix (meadow fescue, timothy, rye) and 15.4 % to birch. We have not detected any antibodies to banana, meat mix (beef, lamb, pork) and soya protein.

In accordance with the results, 18.7 % of adult patients (18–60) had allergen specific antibodies E to pea; 15.6 % to tomato, carrot; 12.5 % to honey, chicken, wheat flour, potato, apricot; 9.3 % to watermelon, strawberry; 6.2 % to goat's milk, walnut, orange, peach, egg yolk, apple, pineapple, celery, beef, lamb, cow's milk, egg white; 3.1 % to sesame. There have not been detected any antibodies above normal to coffee.

Furthermore, we tested 90 patients by the use of a mix panel. By analyzing the results, we got the following percentage. 24.4 % of patients had antibodies to nuts (peanut, hazelnut, almond, Brazil nut, coconut, walnut), 26.6 % to milk mix (casein, cow's milk, milk powder), 18.8 % to birch, 17.7 % to mould fungi (*Mucor mucedo*, *Rhizopus nigricans*), aspergillii mix (*Aspergillus flavus*, *Aspergillus fumigatus*, *Aspergillus niger*, *Aspergillus versicolor*) and 12.2 % to latex. All the latex sensitized patients (100 % cases) had reaginic antibodies over 1 RAST to birch and nuts; 45.4 % of them had antibodies to mould fungi.

After allergy product determination, we offer an elimination of the cause allergen out of patient's ration. The knowledge of food

protein's structure and cross properties with other allergens groups helps dietitians and patients with a creation of a diet ration. Structural studies often reveal features of biologic importance that might not be apparent from biologic assays. Allergens belong to protein families with diverse biologic functions that can be summarized as follows: Indoor allergens (enzymes (especially proteases), ligand binding proteins or lipocalins, albumins, tropomyosins, and calcium-binding proteins), pollen allergens (pathogenesis-related proteins, calcium-binding proteins, proteins, pectate lyases,  $\beta$ -expansins, and inhibitors), plant and animal food allergens (LTP- lipid transfer protein profilins, seed storage proteins, and tropomyosins) [8].

Plant food allergens include the seed storage 2S albumins found in tree-nuts and seeds, the defense-related nonspecific lipid transfer proteins found in soft fruits and vegetables, and cereal  $\alpha$ -amylase/trypsin inhibitors [5; 8]. The second major superfamily of plant food allergens, the cupin family contains 2 groups of seed storage proteins called vicilins and legumins, which are important peanut and tree nut allergens. The profiling and Bet v 1 family includes tree pollinosis-associated food allergens with low stability that induce symptoms of the oral allergy syndrome. These 4 protein families contain approximately 65 % of all plant food allergens. Of the remaining 27 allergen-containing protein families, more than 50 % harbor allergenic proteins of the plant defense system or pathogenesis-related proteins, such as the cysteine proteinases, thaumatin-like proteins, or chitinases [5; 9].

The most important animal food allergens are present in milk, egg, and seafood. Mammalian milk allergens are found predominantly in 3 protein families,  $\alpha$ -lactalbumin, which is essential for milk production, is a member of glycosyl hydrolase family.  $\beta$ -lactoglobulin is a lipocalin, and the casein family harbors the major constituents of milk. Ovomuroid, the most important egg allergen, is a serine protease [9].

Phytalbumin and animal protein dominated amongst the food allergy ill in causal food allergens spectrum. Cow's milk and chicken protein are the most common cause of food allergy among animal proteins, and cereals proteins are widespread among phytalbumins, especially for children. Cereals intolerance can appear both as a food allergy and as a gluten enteropathy that often makes diagnosis and treatment complex. It was detected that 30 % of allergic children had allergen IgE-antibodies characterized by digestive system and skin symptoms [1].

Fruit and vegetable allergies are the most prevalent food allergies in adolescents and adults. The identification of the allergens involved and the elucidation of their intrinsic properties and cross-reactivity patterns has helped in the understanding of the mechanisms of sensitisation and how the allergen profiles determine the different phenotypes. The most frequent yet contrasting fruit and vegetable allergies are pollen-food syndrome (PFS) and LTP syndrome. LTP syndrome results from a primary sensitisation to LTPs, which are stable plant food allergens, inducing frequent systemic reactions and even anaphylaxis [6]. PFS usually presents with pruritus and swelling of the mouth and throat during or just after ingestion of fresh, uncooked fruits and vegetables [7]. LTP can be an important cause of allergy given their stability and high degree of protein sequence homology. LTP allergy should be considered when anaphylaxis is inconsistent, such as in patients who can tolerate fruit pulp but react to fresh whole fruit juices [10].

Fruit family Rosacea is one of the most common fruit allergens in hot climate conditions (peach, apple, strawberry, apricot). Allergy on apples was combined with allergy on birch pollen for 25 % of patients. Presumably, this combination was observed due to some

similarities between allergens, and the allergy was expressed in a form of allergic rhinitis, bronchial asthma. Only 2.5 % of patients had oropharyngeal affection [1].

In our case 12.5 % of patients had sensibilization to walnut and 5 % to peanut. It should be noted that allergic properties of peanut increase by culinary processing. Two main peanut allergens are coctostable and resistant to digestive enzyme's actions. It ought to be observed that allergy to peanut and to other legumes often begin in the childhood and remain constant for a long time. The allergy can be observed even in adulthood [1; 4].

The lack of uniform diagnostic criteria, the variety of clinical manifestations of food intolerance, conditioned by different (immunological and non-immunological) mechanisms and of development of allergic cross-reactions for food products, often leads to misdiagnosis, and therefore to wrong diet therapy.

Eliminating diet prescription tactics depends on examination period, severity of clinic manifestations, causal allergens spectrum, and patient's age. Diet therapy effect is determined not only by an accurate identification of food product that causes the development of allergic reactions, and by its ability to cross reactions, but also by a correct determination of reasonability and elimination duration depending on allergic properties of food allergens.

The usage of "in vitro" methods in specific diagnosis may be the only possible measure in cases when, for instance, skin tests are dangerous or impossible (with an occurrence of skin allergic processes, for example, atopic dermatitis, urticaria) in the period of bronchial asthma exacerbation or pollinosis with no option of antihistamine withdrawal after having an anaphylactic shock in the past. In addition, "in vitro" methods are useful when clinical methods appeared to be not informative enough. The test is informative in the period of allergic diseases exacerbation, and the test does not need a special patient's preparation. Moreover, there is no risk of systemic reactions occurrence and allergic diseases exacerbation because of the test. The reason is that a contact between a patient and an allergen is eliminated.

There are several advantages of "in vitro" method over skin tests: the examination can be conducted in the period of exacerbation; there are no age restrictions (it is possible to use "in vitro" method for infants, pregnant women, in the period of lactation and for elderly people); there is no necessity in antiallergic treatment withdrawal the period of examination; it is possible to detect a sensibilization to a number of allergens at once.

It is considered to be a disadvantage of the method that the "in vitro" examination takes more time than skin tests. Furthermore, the method may show a negative take for the patients with atopic diseases due to a short life span of circulating IgE or because of IgG-conditioned reaction occurrence. Before a specific allergic diagnosis method prescription, an immunological mechanism treats of allergic reaction realization needs to be taken into consideration in order to determine a list of possible allergens. For this purpose, a doctor has to thoroughly scrutinize an anamnesis, clinic manifestations of a disease in the past and the presence. Analyzing this the doctor should assume allergens spectrum and type (types) of patient's immune system.

### Conclusion

All things considered, it is reasonable to note the actuality and availability of the usage of immunoblot allergens panels for eliminating diets planning. Diets therapy is based on the detailed analysis of a composition and allergic properties of the food product. Apart from that, climatic diet features are taken into account. "In vitro" diagnostics is safe for patients, and it creates conditions for an early causal allergens diagnosis and for a latent sensibilization determination.

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## Histological structure of rat heart in the early stages of ontogeny

**Abstract:** In order to identify the features of morphogenesis in postnatal ontogenesis examined histological structure of different departments and shells in the heart of rats 1–22 days after birth. There alternating periods of acceleration and deceleration of the growth rate increase in the thickness of the atrium and the ventricles. The thickness of the endocardial and epicardial increases less significantly. The growth rate of the ventricular myocardium thickness observed in rats 6 and 16 days of age. Structural changes occur due to the growth of the organism. A special feature of the structure and topography of the heart microvessels is their distribution in the course of the cardiomyocytes and the relationship with the fibrous structures of the connective tissue of cardiomyocytes.

**Keywords:** heart rats, postnatal ontogenesis, cardiomyocytes, fibrous structure of the atrium and the ventricles.

### Relevance of the topic

Analysis of recent data shows that cardio vascular disease remains the leading cause of death in the developed world [1; 2; 3; 5]. Heart frequently undergoes pathological effects of endogenous and exogenous stimuli, resulting in not only a violation of its function, but also develop various pathological processes in the body. Heart animals and humans and can be adapted to change depending on lifestyles and total body burden [7]. The age structure of the heart is of some importance in the disclosure of certain pathological processes developing in it. Also in the pathogenesis of many diseases of the cardiovascular system it plays a major role component connective infarction, it is the most dynamic component in the heart during morphogenesis and pathogenesis [4; 6; 8]. Therefore, a deep and comprehensive study of the structure of the heart walls and connective tissue component, is relevant and reasonably identified the choice of the direction of our research. The heart of the rat is a convenient model for experimental studies, as well as to obtain enough material to study.

### Materials and methods

Studied 50 heart rats at 1, 6, 11, 16, 22 hours after birth. In each age group studied 10 rats heart. The animals were kept under standard vivarium conditions at  $t$  21–22 °C and natural photoperiod on a normal diet. Experimental studies were carried out in accordance with the “Rules of work with the use of experimental animals”. Slaughter of rats was performed under ether anesthesia. After

opening the chest and abdominal cavities of the material was fixed in 12 % neutral formalin solution, then isolated heart. After fixation, the heart was withdrawn, and washed for 1-x days in running water. After the body was carried out by increasing the concentration of alcohols. Then the organ divided by the atria and ventricles, and embedded in paraffin. Histological sections 8–10 microns were prepared from paraffin blocks. Apply stain sections with hematoxylin and eosin, van Gieson techniques, Weigert and impregnation method Foote modification Yurina. Morphometric measurements of the wall thickness of the atrium and ventricle are made via the line by increasing ocular ob. 90 microscope ok. 7. Mathematical processing of data was performed using Microsoft Excel 2010 application programs in the topic of descriptive statistics, determining the standard deviation, the arithmetic mean  $M$ , the average error of the relative values of  $m$ . Authenticity of the received data at  $P < 0.05$ .

The wall of the atrial heart rats is characterized by uneven thickness. Analysis of the table shows that the thickness of the left and right atrium for the entire study period gradually increases. The 6-day age rats in the left and right atrial wall thickness increase compared to infants is 14 % and 11 %. At 11 days of age, compared to 6 daytime pups left atrial thickness increase of 21 % and 14 % of the right atrium. In 16-day old rats 18 % and 13 %. The growth rate of the left and right atria thickness in rats 22 days of age increased by almost the same and amounts to 20 % and 19 %. Thickness endocardial right

and left atrial timing is not the same in all of ontogenesis, larger in the left atrium, a right lower (Table 1). Endocardium heart atria rats submitted to a single layer of endothelial cells. The nuclei of endothelial cells have a rounded shape (Fig. 1).

In atrial endocardium bundles of collagen fibers have different packing density. Bundles of fibers of the connective tissue, lying closer to the atrial lumen arranged loosely, beams lying next to the atrial myocardium more closely adjacent to each other. And they are interwoven with bundles of connective tissue fibers from the inner layer of cardiomyocytes atrial myocardium. The thickness of the bundles of collagen fibers in the endocardium ranges from 5.7 microns to 7.6 microns. The thickness of the endocardium beams of elastic fibers ranges from 3.8 to 7.6 microns. Reticular fibers for atrial endocardial have a different layout density. They are intertwined with the reticular fibers of the connective tissue layers located between the beams of cardiomyocytes inner layer of the atrial myocardium. Rat atrial myocardium is represented by two layers of cardiomyocytes. It consists of a longitudinal surface arranged and directed circularly deep muscle layers. The beams of cardiomyocytes, lying close to the endocardium change direction and are arranged obliquely. The outer layer of beams of cardiomyocytes are arranged longitudinally. In the atrial myocardium boundary between layers of weakly expressed in cardiomyocytes. They are adjacent to each other. Throughout infarction beams of cardiomyocytes in changing the direction of the layers penetrate each other. Atrial cardiomyocytes surrounded by tufts of fibrous connective tissue structures. In the atrial myocardium depending on the site reveals their different direction. In the inner layer of the myocardial bundles of collagen fibers are deposited in a circular direction between the beams of cardiomyocytes. In the depths of the inner layer of the myocardial fiber structure of the connective tissue change direction and are arranged perpendicular to the atrial endocardium. On the periphery of the outer muscle layer of connective tissue bundles change the direction of the longitudinal to oblique and interwoven with bundles of epicardium. At the boundary of the outer and inner layers of myocardium occurs atrial sites where structures intertwined fibrous connective tissue. The thickness of the bundles of collagen fibers between the tufts of cardiomyocytes ranges from 5.7 to 11.4 microns. The thickness of the bundles of elastic fibers from 3.8 microns to 11.4 microns. Reticular fibers in the myocardium of the atria occur in connective layer between the beams of cardiomyocytes. Reticular fibers located along the cardiomyocytes to form various shapes and sizes hinges. The high density reticular fibers detected between the beams of cardiomyocytes inner layer atrium. The study of the structure of the wall of atrial septal showed that the partition wall is formed of both atria. In atrial epicardium beams of elastic fibers lie loosely compared with bundles of collagen fibers. The thickness of the atrial epicardium bundles of collagen fiber ranges from 5.7 to 7.6 microns, the thickness of the elastic fiber bundles ranges from 3.8 to 7.6 microns. Reticular fibers in the epicardium atrial arranged more densely.

Ventricular endocardium comprises a longitudinally directed bundles of collagen fibers. Identify areas where longitudinal occurring bundles of collagen fibers are intertwined with each other. The fiber bundles of connective tissue located closer to the myocardium of the ventricles are interwoven with bundles of connective tissue fibers located between the beams of cardiomyocytes inner layer of the myocardium. The thickness of the bundles of collagen fibers endocardial ventricular ranges from 5.7 mkm. to 11.4 microns. Beams ventricular endocardial elastic fibers lie loosely compared with bundles of collagen fibers. In bundles of fibers adjacent to the ventricular

myocardium increased packing density. The thickness of the elastic beams ventricular fibers ranges from 5.7 to 9.5 microns. Reticular fibers ventricular endocardium located close to each other (Fig. 2).

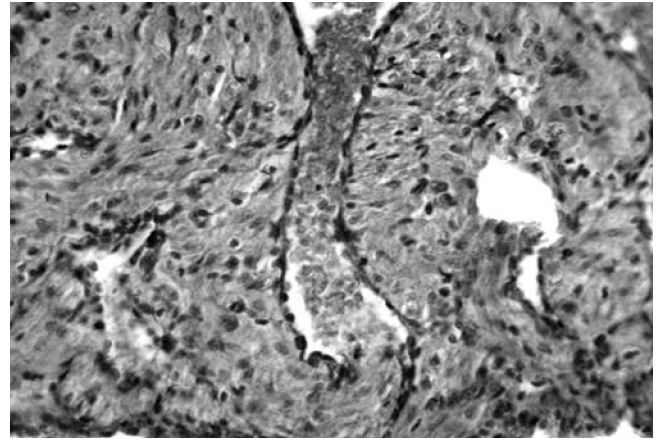


Fig. 1. Endothelial cell wall of the left atrium of the heart six day old rats in the control group. Staining: hematoxylin-eosin. Magnification: oc. 10, ob. 20

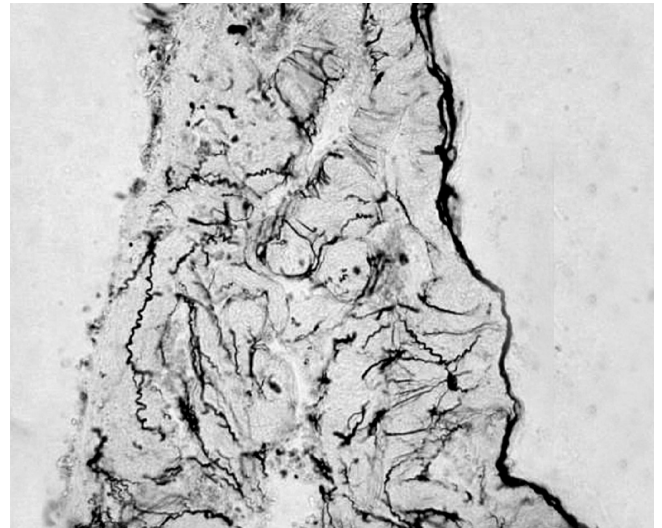


Fig. 2. Reticular fibers lateral endocardial wall of the left ventricle 6 days of age in the control group. Staining: Impregnated with silver nitrate by Fotee in Yurina modification. Magnification: oc. 10, ob. 20

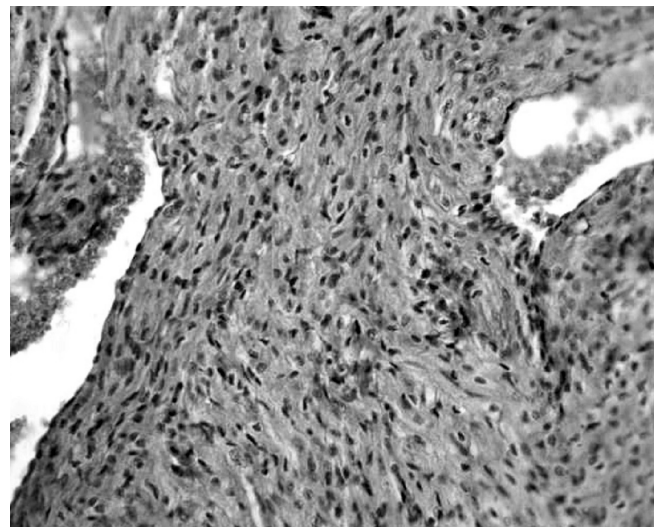


Fig. 3. Interventricular septum rat heart 6 day old rats in the control group. Staining: hematoxylin-eosin. Magnification: oc. 10, ob. 20

The ventricular myocardium is represented by 3 layers of cardiomyocytes. Outside, subepicardial layer contains cardiomyocytes, forming longitudinal beams, are found in the middle layer of circularly directed beams, inner subendocardial layer containing slightly obliquely oriented bundles of cardiomyocytes. The outer and inner layers of the longitudinal direction belongs to both ventricles. Superficial fibers cover both ventricles evenly. Internal fiber bundles as it approaches the endocardium become more oblique direction and pass into the papillary muscles. Middle circular layer belongs to only one of the ventricles. Study direction beams ventricular myocardial fibers showed that circularly directed layer has not always not always a clear orientation. Beams of the middle layer of the front wall of the ventricular fibers directed obliquely deflected toward the endocardium. Between the layers of cardiomyocytes ventricular myocardium border weakly expressed. They fit snugly to each other. In the middle layer of beams of cardiomyocytes are arranged circularly. The beams of cardiomyocytes occurring at the inner layer of the myocardium change the direction of the longitudinal to oblique. In the border areas with average myocardial layer in the outer layer of the cardiomyocytes bundles begin to change the direction of the longitudinal to oblique. The left ventricle is not detected a significant difference in the thickness of the layers of cardiomyocytes. The inner layer consists of myocardial parallel beams cardiomyocytes that are parallel with the endocardium. The outer layer of the myocardium and puchkoobraznoe has a loose structure, it cardiomyocytes arranged in different directions. The middle layer of the left ventricular myocardium cardiomyocytes beams are perpendicular with respect to the inner layer. In the center there is a cardiomyocyte oval nucleus at 1–2. Core cardiomyocyte cells located in the center and at the periphery myofibrils. The right ventricular cardiomyocytes into myocardial beams layers similar left ventricular myocardium. But unlike the left ventricular myocardium in the right ventricle of the circular layer thickness cardiomyocytes 2–3 times thicker than the thickness of the layers of longitudinal cardiomyocytes. The nucleus of cardiomyocytes differed elongated shape. In some places in the middle layer of the myocardium revealed arterioles. The outer layer of the myocardium has a large number of venules with a variety of forms. In ventricular myocardium of the heart, depending on the site bundles of collagen fibers having different directions. At the apex of the heart bundles of collagen fibers are directed obliquely, of the bundles of collagen fibers changes the direction of the skew on the longitudinal. The inner layer of myocardial collagen bundles lie longitudinally separating bundles of cardiomyocytes from each other. In the middle layer between the beams of cardiomyocytes myocardial collagen fibers forming beams having a circular direction. The outer layer of the myocardial bundles of collagen fibers are deposited obliquely between the beams of cardiomyocytes. The thickness of the bundles of collagen fibers in the ventricular myocardium varies from 7.6 microns to 13.3 microns.

Reticular fibers in the ventricular myocardium have a different direction depending on the layer. In the inner layer of reticular fibers lie longitudinally in the apex of the heart they are interwoven with the reticular fibers of the outer layer of the heart attack. In the middle layer of myocardium reticular fibers between cardiomyocytes bundles are arranged in a circular direction. The outer layer of the ventricular myocardium reticular fibers lie obliquely, in the apex of the heart increases the density of their location. Reticular and elastic fibers around the beams of cardiomyocytes form a network of various sizes and shapes. Connecting direction of the fiber bundles depends on the direction

of cardiomyocytes. They envelop the individual muscle bundles, forming loops of various shapes and sizes. In the myocardium bundles of reticular and elastic fibers it is directed along the beams of cardiomyocytes. Interventricular septum consists of two longitudinal and one circular layer. Longitudinal layers are formed on the left and right of the respective layers of both ventricles longitudinal and circular middle layer is formed by a circular layer of the left ventricle (see fig. 3).

In ventricular myocardium occur arterioles, capillaries, venules and sinusoids. Arterioles characterized in that between the thin inner sheath clearly pronounced middle shell and an outer shell mild. Inner sheath arteriolar endothelial cell nuclei represented rounded shape, they are at a slight distance from each other. Clearly marked tunica consists of circularly directed bundles of muscle fibers. They form two layers. The outer shell is formed by loose fibrous tissue, there are different adventitial cells. The thickness of the inner diameter ranges from 9.5 to 15.2 microns, and an average of  $11.7 \pm 0.6$  microns.

Venules infarction in most cases represented by sinusoids of different diameter and different form. The wall of the venules is presented by the endothelial cells, which are located at a great distance from each other. The muscular layer venules underdeveloped. Venules thickness ranges from 15.7 to 20.5 microns. Myocardial sinusoids have an elongated, oval, or irregular shapes. Sinusoids found in podepikardialnom layer. sinusoids wall consists of a single layer of endothelial cells. In most cases elongated endothelial cells. capillary wall is represented by endothelial cells. The nuclei of endothelial cells are round and oval shape. They are at a slight distance from each other. The thickness of the inner diameter of the capillary has a thickness of from 5.7 to 11.4 microns, in an average —  $9.3 \pm 0.6$ .

The ventricular epicardium bundles of collagen and elastin fibers lie longitudinally, and have a greater packing density than the bundles of collagen and elastic fibers endocardial. The ventricular epicardium collagen fiber bundles thickness ranging from 5.7 microns to 11.4 microns, beams of elastic fibers have a thickness of from 5.7 microns to 9.5 microns. The ventricular epicardium reticular fibers are arranged longitudinally. Analysis of the table shows that the thickness of the bottom of the ventricle is always prevails over the top. The thickness of the right ventricular wall is always less than the right side. Increasing the wall thickness only occurs over 6 and 16 hours after birth, their growth rate is in the left ventricle 27% and 22%, and in the right ventricle 19% and 15%. On day 11 the thickness increase is reduced to 14% of the left ventricle and the right 11%. On day 22 after birth, increase of left and right ventricular thickness is 21% and 16% respectively.

#### Conclusions.

1. The results of the study suggest that the time of birth in white rats heart is not fully differentiated, their development continues after birth.
2. The myocardial blood vessels are directed along the beams cardiomyocytes. The vessels are surrounded paravasal bundles of connective tissue. The difference in diameter intraorgan vascular walls of the left and right ventricles almost none.
3. The superficial fibers cover the left and right ventricle uniformly. Internal bundles of myocardial fibers as it approaches the endocardium become more oblique direction and pass into the trabeculae and papillary muscles. The middle layer consists of a circularly directed beams of cardiomyocytes, which belongs to only one of the ventricles.



Table 1. – Indicators of the layer thickness of the side wall of the atria of the heart of the control animals, in microns (M ± m), mm, n = 10

Time trials	Left atrium				Right atrium			
	Total	Endocardium	Epicardium	Myocardium	Total	Endocardium	Epicardium	Myocardium
Newborns	67.03 ± 1.9	9.7 ± 0.4	48.43 ± 1.6	8.6 ± 0.4	33.5 ± 1.45	8.5 ± 0.6	17.5 ± 1.12	7.5 ± 0.5
6 days	69.9 ± 2.87	11.4 ± 0.23	49.7 ± 2.54	8.8 ± 0.23	37.5 ± 0.68	9.6 ± 0.21	19.6 ± 0.76	8.3 ± 0.22
11 days	84.7 ± 2.67*	13.5 ± 0.32	60.8 ± 2.64*	10.4 ± 0.43	42.8 ± 1.76	11.4 ± 0.43*	21.6 ± 0.18	9.8 ± 0.12
16 days	96.4 ± 2.44	14.7 ± 0.16	70.1 ± 1.76*	11.6 ± 0.13	50.7 ± 1.54	12.8 ± 0.14	27.2 ± 0.14*	10.7 ± 0.14
22 days	116.5 ± 3.24*	17.5 ± 0.43	85.6 ± 2.43	13.5 ± 0.13	60.4 ± 2.34	14.9 ± 0.12*	32.9 ± 0.27	12.6 ± 0.06

Note: \* —  $P < 0.01$  the accuracy in comparison with the previous period.

Table 2. – Indicators of side wall layer thickness ventricular control animals in microns (M ± m), mm, n = 10

Time trials	The ventricle	The upper part				Of the lower part			
		Total	Endocardium	Epicardium	Myocardium	Total	Endocardium	Epicardium	Myocardium
Newborns	The left	675.9 ± 12.23	14.8 ± 0.74	645.5 ± 12.4	15.6 ± 0.14	918.7 ± 14.8	43.6 ± 1.8	885.1 ± 12.9	15.2 ± 0.23
	The right	320.5 ± 7.54	15.4 ± 0.53	290.3 ± 7.44	14.8 ± 0.62	385.65 ± 6.78	16.15 ± 0.61	355.25 ± 7.23	14.25 ± 0.54
6 days	The left	862.6 ± 5.84	17.1 ± 1.10	828.2 ± 6.63	17.3 ± 0.72	1046.53 ± 1.13	20.9 ± 1.13	1008.91 ± 1.14	16.72 ± 1.1
	The right	383.2 ± 7.08	17.9 ± 1.03	349.2 ± 7.29	16.2 ± 0.42	431.89 ± 1.12	18.24 ± 1.2	397.88 ± 1.12	15.77 ± 1.1
11 days	The left	990.6 ± 5.6*	19.6 ± 1.06	952.1 ± 5.3	19.0 ± 0.75	1278.7 ± 1.22	24.7 ± 1.18	1234.24 ± 1.22	19.76 ± 1.18
	The right	425.7 ± 3.7*	20.3 ± 0.5*	387.7 ± 3.3	17.7 ± 0.85	519.36 ± 1.23	21.66 ± 1.15	479.08 ± 1.20*	18.62 ± 1.18
16 days	The left	1209.8 ± 10.75	22.0 ± 0.71	1167.3 ± 11.42*	20.5 ± 0.84	1473 ± 1.15*	27.93 ± 1.13	1423.03 ± 1.15*	22.04 ± 1.11
	The right	493.2 ± 12.38	23.4 ± 0.85	450.7 ± 12.4	19.2 ± 1.04	596.81 ± 1.14*	24.32 ± 1.12	552.16 ± 1.15*	20.33 ± 1.09
22 days	The left	1468.3 ± 9.23	24.9 ± 0.57	1421.0 ± 8.56	22.4 ± 0.89	1796.58 ±	33.24 ± 1.19	1737.68 ± 1.22	25.65 ± 1.16
	The right	574.3 ± 20.38	26.8 ± 0.82	523.7 ± 20.25	23.8 ± 1.37	718.98 ± 1.20	28.31 ± 1.16	667.87 ± 1.21*	22.8 ± 1.12

Note: \* —  $P < 0.01$  the accuracy in comparison with the previous period.

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## Indicators of hematological tests and hemostasis as predictors of hemorrhagic complications in children with acute lymphoblastic leukemia

**Abstract:** The trial analyzed the significance of hemostatic parameters and blood analyses as prognostic markers for the development of hemorrhagic complications in children with Acute Lymphoblastic Leukemia (ALL) at the early onset of disease.

In addition to that the research identifies the correlation between the amount of fibrinogen, blasts, immature white blood cells and the level of thrombocytopenia ( $p < 0.05$ ). It was established that in the early grades of disease in children with ALL indexes of hematological and hemostasis tests poorly correlate with the degree of thrombocytopenia and hemorrhagic syndrome cannot serve as a marker of risk of hemorrhagic complications development.

**Keywords:** acute lymphoblastic leukemia, children, hemostasis, hemorrhagic complications.

### Relevance

Acute leukemia is the most common form of neoplastic diseases in children: in the structure of malignant tumors, acute leukemia account for about 32%. Among all forms of leukemia, acute lymphoblastic leukemia (ALL) is the most prevalent, and constitutes 75–80% of cases. The use of modern treatment protocols have drastically changed the outcomes of acute leukemia, until recently it was considered as fatal disease: nowadays long-term event-free survival can be achieved in 70–95% of children with newly diagnosed ALL [3; 5; 10]. However, a protocol of intensive chemotherapy, as well as the neoplastic process itself, often leads to the development of severe complications that hinder to full treatment, and requires high-quality and expensive supportive therapy [4; 5; 7; 9].

Along with infectious, septic and organ-toxic complications, negative impact on the results of treatment of patients with ALL, have complications that are associated with disorders of the hemostatic system. The risk of these complications is caused by inhibition of normal hematopoiesis and the development of thrombocytopenia, accompanied by the acute leukemia, starting with the early grades of the disease [1; 6]. Severe multidirectional abnormalities in the hemostatic system that prevail to perform polychemotherapy (PCT) within the strictly defined terms, developed in 43.5% patients with ALL. Symptomatic manifestations of hemostatic disorders in cases of ALL ranged from localized thrombosis to hemorrhagic syndrome of different severity. The genesis of hemorrhagic syndrome in hematologic malignancies in children is complicated as it has a direct relationship with the primary malignancy and with its complications.

Prevention and treatment of hemorrhagic syndrome in children with ALL involves a differentiated correction for disorders of coagulation and anticoagulant part of hemostasis, diagnosing of which is necessary before starting treatment and during treatment. However, the literature suggests untimely and inadequate diagnosis of hemostasis disorders and their correction in children with ALL [6].

Timely prevention of complications caused by hemostasis disorders requires the use of reliable markers capable of indicating the links in the chain of the imbalance of coagulation and anticoagulation mechanisms and identifying violations of the hemostatic system even before their clinical manifestation.

### Objective

To study the significance of the indicators of hemostasis and hematological tests, as markers of risk of hemorrhagic complications development, in children with acute lymphoblastic leukemia.

### Materials and Methods

Study included assessment of the main laboratory parameters of blood and hemostasis in 25 children aged from 6 months to 15 years with newly diagnosed acute lymphoblastic leukemia (primary patients). Patients were divided depending on the severity of the hemorrhagic syndrome (HS) (group 1 with 0 and I grade of HS — 17 patients; group 2 with II and III grade of HS — 8 patients) and severity of thrombocytopenia (group 1 — mild and moderate degree of thrombocytopenia — 7 patients; group 2 — severe degree of thrombocytopenia — 18 patients).

The hemostatic system was assessed by determining the following parameters: activated partial thromboplastin time (APTT), prothrombin time (PTT), thrombin time (TT), level of fibrinogen,

Hageman factor — dependent fibrinolysis (HF-DF) by means of the orthophenanthroline method, amount of soluble fibrin monomer complexes (SFMC) and D-dimers. In addition to them, indicators of physiological anticoagulants — activity of the protein C (PrC) and the activity of antithrombin III (AT III) were assessed [1; 2; 8].

### Statistical treatment

The statistical analysis was performed using the standard software package of Microsoft Office Excel, STATISTICS 6.0. Comparison of groups of patients for categorical attributes was performed using T-Students' criteria. We evaluated the confidence level  $p$ , the differences between groups were considered for statistically significant at a significance level of  $p < 0.05$ .

### Result and discussion

The results of our research of the hemostatic system in children with ALL at the midst of clinical manifestations showed the presence of differently directed shifts depending on the severity of the hemorrhagic syndrome and the severity of thrombocytopenia, according to this, patients were divided into groups. In groups of patients with ALL, that was ranked according to the grade of hemorrhagic syndrome (group 1 — without HS or with I grade of HS, group 2 — with HS of II and III grade) a comparative intergroup analysis showed no significant changes in basic hematologic parameters of blood (Table 1). The study of hemostasis revealed, that such biochemical parameters of coagulation and fibrinolytic system as: activated partial thromboplastin time (APTT), prothrombin time (PTT), thrombin time (TT), fibrinogen level, Hagemann-dependent lysis time, (XIIa – dependent lysis time), the rate of soluble fibrin-monomeric complexes (SFMC), activity of protein C (PrC) and antithrombin III (AT III) had no significant value between the first and second groups of patients (Table 2).

APTT characterizes the internal way of activation of blood coagulation under standard conditions of contact activation, and evaluates the involvement of coagulation factors in forming of tenase and prothrombinase complexes without affecting platelet phospholipids of the patient. This figure depends on the level of high molecular weight of kininogen, prekallikrein and clotting factors XII, XI, VIII, IX and less sensitive to change of factors X, V, prothrombin and fibrinogen. Lengthening of APTT is observed in the decrease of the activity of next factors: VIII, IX, XI, XII, and may be associated with an increased risk of hemorrhagic complications. In the study of coagulation parameters in children with ALL the activated partial thromboplastin time in HS 0 and I level was  $33.9 \pm 5.2$  seconds, while in the group with HS II and III grade it constituted —  $29.6 \pm 2.1$  seconds ( $N = 21.1–36.5$  sec.).

The prothrombin time (Quick prothrombin), describes the external coagulation cascade and the second phase of plasma hemostasis (prothrombine and thrombine formation) and reflects the activity of prothrombin complex factors (factors VII, V, X and II). By reducing, the activity of prothrombin complex factors VII, V, X, II the time of clot formation in plasma is slowed down and, accordingly, prolongs the prothrombin time. The lengthening of the PTT demonstrates the tendency to hypocoagulation, shortening — tendency to hypercoagulation. Regardless of the severity of HS PTT indicator (Quick prothrombin), in patients with ALL was in the range close to and within the normal range ( $76.7 \pm 5.8\% - 78.8 \pm 5.0\%$ ,  $N = 70–120\%$ ).

Fibrinogen — blood coagulation factor I, which is produced in the liver. Under the action of thrombin it is converted to fibrin, which participates in the formation of a blood clot. Fibrinogen deficiency characterized the violation of a stable thrombus formation and bleeding disorders and the excess — the tendency to thrombosis. In addition, concentration of fibrinogen in blood increases while diseases involving tissue injury and inflammation. Evaluation of fibrinogen level in children with various forms of hemorrhagic syndrome in ALL showed that the values of the indicator in HS of 0–I grade is made up  $0.6 \pm 4.3$  g/l, while HS of II–III grade —  $4.5 \pm 0.8$  g/l, which exceeds the normal rate borders (N — 1.8–4.0 g/l).

Thrombin time is a screening coagulation time of the final grade of blood clotting — rate of transformation of fibrinogen to fibrin. It depends on the content of fibrinogen and inhibitors that block the action of thrombin and the conversion of fibrinogen to fibrin. Patients with HS of 0–I grade had the normal range (N — 9–14 sec.) of TT indexes was and made up about  $12.2 \pm 0.74$  seconds. Children with HS of II–III grade TT also did not exceed the normal rate ( $1.28 \pm 1.26$ ;  $p > 0.05$ ). Patients who have an elongated clotting time, the conversion of fibrinogen to fibrin slowed, which increases the risk of bleeding. In our monitoring, children with AL in a debut of disease TT index did not correlate with the degree of hemorrhagic syndrome severity.

Antithrombin III — specific protein of blood coagulation system, main function is to inactivate key coagulation factors, including thrombin, f. Xa, IXa and Xia, also to restrict increased thrombocyte formation. Manifestation of ATIII deficiency is relapsing arterial and venous thrombosis. The process of thrombin generation is also interrupted with plasma protein C in the presence of its cofactor — protein S. The levels of physiological anticoagulants ATIII and PrC between the groups were not statistically different and were within the normal range (ATIII — 81.5–84.7%, N — 72–124 (134) % PrC — 1.2–1.7 units, N — 0.7–1.3 units). The study of blood fibrinolytic system parameters has shown that the Hageman — dependent lysis time had no significant difference between the groups and was  $12.06 \pm 1.27$  minutes in the subgroup of HS in 0–I grades and  $10.14 \pm 2.52$  min. in other group with HS of II–III grades (N — 5.5–12.0 min). Increasing the rate of SFMC — thrombinemia markers — also had no statistically significant difference between the groups, however, in both cases it exceeded the reference values (6.1–6.8 mg/l, N — 0–3.38 g/L).

D-dimers are formed during clot lysis and under the influence of plasmin and other proteolytic enzymes. Their concentration is proportional to the activity of fibrinolysis in the blood and the number of lysed fibrin, which gives an indication of the intensity of the processes of formation and destruction of fibrin clots. The qualitative test for D-dimers showed that in the subgroup with HS 0–I grade 12.5% of patients had positive results that are above the reference level of D-dimers (normal concentration of D-dimer is not more than 400–500 ng/ml fibrinogen equivalent units — FEU) and reactive fibrinolysis. In other 87.5% of patients with HS 0–I grade and 100% of patients with HS II–III grade, D-dimer level were negative in qualitative test, indicating that the activation of intravascular coagulation and fibrinolysis is absent.

Depending on the severity of thrombocytopenia patients were divided into 2 groups: group 1 — patients with mild and moderate degree of thrombocytopenia; group 2 — patients with severe degree of thrombocytopenia. In the group with severe degree of thrombocytopenia 38.9% of the patients had clinical manifestations like disorders in hemostasis, such as petechiae, bruising after the injection, hematomas, bleeding at the injection site, gingival bleeding. In the group of children with mild to moderate degree of thrombocytopenia clinical manifestations and violations in hemostasis were not observed.

Level of hemoglobin in mild and moderate thrombocytopenia was by 25% higher in comparison with thrombocytopenia of severe degree ( $90.71 \pm 5.47$  g/l vs.  $68.0 \pm 4.14$  g/l;  $t = 2.56$ ;  $p < 0.05$ ). With the development of severe thrombocytopenia was noted almost eleven times higher rate of total white blood cells, but the significance was not reliable because of the importance of a substantial parametric variation in the samples. Moreover, in patients with mild to moderate thrombocytopenia compared to patients with severe thrombocytopenia by 72.7% and 65.5%, respectively, parameters of stab neutrophils ( $1.43 \pm 0.42\%$  versus  $0.39 \pm 0.13\%$ ;  $t = 2.36$ ;  $p < 0.05$ ) were higher and segmented neutrophils ( $24.57 \pm 5.47\%$  versus  $8.39 \pm 2.46\%$ ;  $t = 2.70$ ;  $p < 0.05$ ). The significant factor in these subgroups was also changes in the number of blasts. The amount of blasts in the blood of patients with severe thrombocytopenia increased by 58.7% in comparison with the group of mild to moderate thrombocytopenia level ( $37.4 \pm 6.02 \pm 9.20$  vs.  $15.43\%$ ;  $t = 2.0$ ;  $p < 0.05$ ) (Table 1). However, it should be noted that the increasing blasts and immature leukocytes in the leukemia related to inhibition of normal hematopoiesis, which is a cause of disease but not a consequence of thrombocytopenia. Finally, in both groups revealed an inverse relationship between number of platelets and leukocytes, as well as between platelet and blast cells, which indicates a decrease in the number of thrombocytes due to their lack of formation: if degree of leukocytosis would be high, the normal myelopoiesis — more suppressed. Our research revealed a direct correlation between the decrease in the number of platelets and proportion of mature differentiated leukocytes — stab and segmented, which is also a consequence of the inhibition of normal hematopoiesis. A similar results in leukemia also was found and by other researchers [1].

Comparative evaluation of hemostasis in the groups among the patients with severe degree of thrombocytopenia, and patients with mild to moderate degree of thrombocytopenia revealed a tendency to reduce the APTT (28.3%) and PTT (12.6%), whereas increasing degree of thrombocytopenia takes place. However, these changes did not have significant difference ( $p > 0.05$ ), which may be related to the spread of the individual values of the studied parameters within the study groups. Noticeable deviation was observed in the content of fibrinogen, which increased by 47% while burdening the degree of thrombocytopenia (from  $2.67 \pm 0.56$  to  $5.04 \pm 0.52$  g/L;  $t = 3.12$ ;  $p < 0.05$ ). Inaccurately increased the rates of physiological anticoagulants ATIII with the development of severe thrombocytopenia. There were not significant modifications in the blood indexes of fibrinolytic system, HF-DF and SFMC between compared groups. In the subgroup of patients with mild to moderate degree of thrombocytopenia, 6.0% of patients had positive result on the D-dimers, which indicating reactive fibrinolysis.

In 94.0% of patients with mild to moderate degree of thrombocytopenia and 100% of patients with severe thrombocytopenia, D-dimers had a negative result in a qualitative analysis (Table 2).

Thus, conducted in Uzbekistan study revealed that the development of acute lymphoblastic leukemia in children affects the state of coagulation and anticoagulation system of blood and shows relevant clinical symptoms and changes in biochemical indices of hemostasis. However, these symptoms do not occur in all patients and have a variable range of values. In addition, parameters of hemostasis and hematological analyzes correlate poorly with the degree of thrombocytopenia and hemorrhagic syndrome and thus may not be a predictor markers of hemostatic disorders in children with acute lymphoblastic leukemia in early grades of development. Prevention of hemorrhagic complications in acute leukemia in children requires finding for new reliable markers that allow to forecast the risk of the hemostatic system disorders prior of their clinical manifestation.

Table 1. – Indicators of blood elements in children with ALL depending on the degree of hemorrhagic syndrome and thrombocytopenia

Group	n	Hemo- globin	Erythro- cytes	ESR	Total leuko-cytes	Lympho- cytes	Blasts	Myelocy- tes	Metamy- elocytes	Band neu- trophil	Segmented neutrophil	Eosino- phil	Monocy- tes
<i>depending on the degree of hemorrhagic syndrome</i>													
1st group. 0 and I grade of HS	17	77.5 ± 5.4	2.9 ± 0.2	20.0 ± 5.8	70.7 ± 38.1	49.1 ± 6.5	32.8 ± 6.9	0.13 ± 0.07	0.13 ± 0.07	0.7 ± 0.2	12.3 ± 3.1	0.6 ± 0.1	3.7 ± 1.0
2 <sup>nd</sup> group. II and III grade of HS	8	66.6 ± 6.9	2.7 ± 0.3	16.1 ± 6.4	22.4 ± 12.7	54.9 ± 10.2	31.1 ± 9.5	0.12 ± 0.12	0	0.5 ± 0.2	9.7 ± 2.5	0.5 ± 0.2	3.0 ± 0.6
Student t-test	25	1.24	1.67	0.45	1.20	0.47	0.14	0.07	0	0.36	0.65	0.34	0.58
<i>depending on the degree of thrombocytopenia</i>													
Mild and moderate degree of thrombocytopenia	7	90.7 ± 7.8	3.2 ± 0.3	18.9 ± 8.6	5.9 ± 3.1	52.7 ± 9.1	15.4 ± 9.3	0.14 ± 0.14	0.14 ± 0.14	1.4 ± 0.4	24.6 ± 5.5	0.9 ± 0.3	4.9 ± 2.0
Severe degree of thrombocy- topenia	18	68.0 ± 4.4	6.4 ± 2.3	17.4 ± 5.1	66.9 ± 33.1	49.8 ± 5.8	37.4 ± 6.0	0.11 ± 0.06	0.06 ± 0.06	0.4 ± 0.1	8.4 ± 2.5	0.4 ± 0.1	2.9 ± 0.4
Student t-test	25	2.56; p < 0.05	1.41	0.14	1.83	0.27	2.00	0.20	0.53	2.36; p < 0.05	2.70; p < 0.05	1.35	1.04

Table 2. – Indicators of the endothelium and hemostasis in children with ALL depending on the degree of hemorrhagic syndrome and thrombocytopenia

Groups	n	Indicators of the coagulation system				Indicators of the fibrinolytic blood system			Physiological anticoagulants		Level of D-dimers
		APTT (sec)	PTT (%)	T'T (sec)	Fibrinogen (g/l)	HF-DF (min)	SFMC (mlg/ml)	Protein C	AT III (%)		
<i>depending on the degree of hemorrhagic syndrome</i>											
1st group. 0 and I grade of HS	17	33.9 ± 5.24	78.8 ± 5.03	12.20 ± 0.74	4.3 ± 0.56	12.06 ± 1.27	6.1 ± 0.50	1.2 ± 0.18	81.5 ± 7.72	87.5% — negative 12.5% — positive	
2 <sup>nd</sup> group. II and III grade of HS	8	29.6 ± 2.11	76.7 ± 5.83	11.28 ± 1.26	4.5 ± 0.79	10.14 ± 2.52	6.8 ± 1.12	1.7 ± 0.20	84.7 ± 8.96	100% — negative	
Student t-test	24	0.76	0.27	0.63	0.21	0.68	0.62	1.92	0.27		
<i>depending on the degree of thrombocytopenia</i>											
Mild and moderate degree of thrombocytopenia	7	41.14 ± 9.82	85.28 ± 5.47	11.53 ± 0.67	2.67 ± 0.56	10.94 ± 1.22	5.33 ± 0.84	1.10 ± 0.28	77.0 ± 4.84	100% — negative	
Severe degree of thrombocy- topenia	18	29.50 ± 1.23	74.55 ± 4.40	12.50 ± 1.61	5.04 ± 0.52	10.29 ± 2.52	6.63 ± 0.58	1.42 ± 0.13	86.18 ± 8.32	94% — negative 6% — positive	
Student t-test	25	1.18	1.53	0.56	3.12; p < 0.05	0.23	1.27	1.03	0.95		

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## Prevention of intestinal failure syndrome in patients with acute intestinal obstruction

**Abstract:** There were analyzed the results of investigation and treatment of 119 patients with acute intestinal obstruction. Timely and adequate enteral treatment measures were an important stage of complex treatment of patients with intestinal obstruction (especially complicated with peritonitis) and, preventing the development of functional intestinal insufficiency, favored treatment outcomes. The studies allowed the rate of postoperative complications to be reduced from 33.9% to 12.7%, lethal outcome from 7.1% to 3.2%.

**Keywords:** acute intestinal obstruction, intestinal insufficiency syndrome, enteral measures, enterosorption, multiple organ failure.

The initial symptoms of intestinal failure syndrome (IFS) in acute intestinal obstruction (AIO), especially mechanical etiology, reflecting primarily pronounced inhibition of motor activity of the intestine may be the result of a reflex earlier-onset disease process. Surgical intervention against this background that becomes another factor contributing to the inhibition of intestinal motility.

Simultaneous local action and reflex factors leads to acute intestinal function failure [7; 9; 11]. Stretching increases the secretion of intestinal loops and extravasation liquid in the lumen of the gut, that the disorder causes a suction further hyperextension of the loop and a reflex inhibition of motility. These changes lead to an increase in intra-abdominal pressure, reduction of the diaphragm excursion and result in respiratory failure, causing a buildup of tissue hypoxia and weighing condition of patients [12; 13].

Consequently, the initial intestinal dysmotility contribute to the development of the IFS, which is the initial link of severe pathological

processes causing growing dramatically with the development of metabolic changes in this background of multiple organ failure (MOF) and leading to the death of the patient [12; 16]. Therefore, after the elimination of the causes of AIO, especially when complication peritonitis, the complex treatment should include prevention of IFS and endogenous intoxication syndrome (EIS), starting with a powerful detoxification therapy, drainage of the abdominal cavity, intubation bowel nasointestinal probes and ending intra-abdominal (lavage or dialysis), and also performing in the early postoperative enteral treatment measures: bowel decompression (BD), intestinal lavage (IL), enterosorption, etc. [2; 3; 6; 15; 16]. Different using methods are often not effective without the implementation of the stimulation of the intestine [5; 8].

In this context, the aim of this study was to improve the results of treatment of patients with AIO by developing and improving enteral treatment measures: BD, IL and enterosorption.

**Material and methods**

We analyzed the results of treatment of 119 patients with acute mechanical intestinal obstruction, non-tumor origin, who was hospitalized to the clinic of Surgical Department of the Tashkent

Medical Academy for the period 2008–2014. Age of the patients ranged from 16 to 80 years. The share of man was 74 (62.2%), and women — 45 (37.8%) patients. Types of AIO are presented in table 1.

Table 1. – Patients with AIO

Types of intestinal obstruction	Control group	Main group
<b>Mixed</b>	<b>29 (51.8%)</b>	<b>41 (65.1%)</b>
Adhesive	27 (48.2%)	23 (36.5%)
Intussusception	2 (3.6%)	–
<b>Strangulation</b>	<b>20 (35.7%)</b>	<b>15 (23.8%)</b>
Volvulus	17 (30.4%)	10 (15.9%)
Formation of nodes	3 (5.3%)	5 (7.9%)
<b>Obturation</b>	<b>7 (12.5%)</b>	<b>7 (11.1%)</b>
Foreign body	2 (3.6%)	2 (3.2%)
Bile stones	2 (3.6%)	4 (6.3%)
Besoars	3 (5.3%)	1 (1.6%)
<b>Total:</b>	<b>56 (100.0%)</b>	<b>63 (100.0%)</b>
<b>Types of surgeries</b>		
Adhesiolysis	27 (48.2%)	38 (60.3%)
Resection of intestine with resto-ration of intestinal passage	15 (26.8%)	15 (23.8%)
Unvolvulus	8 (14.3%)	4 (6.4%)
Enterotomy, remove of foreign body	4 (7.1%)	6 (9.5%)
Desinvagination	2 (3.6%)	–
<b>The structure of postoperative complications</b>		
Failure of suture	2 (3.6%)	–
Continuing peritonitis	2 (3.6%)	–
Eventration	1 (1.8%)	–
Small intestine hole	1 (1.8%)	1 (1.6%)
Early adhesive obstruction	2 (3.6%)	–
Pneumonia	1 (1.8%)	2 (3.2%)
Acute myocardial infarction	3 (5.4%)	2 (3.2%)
Surgical site infection	5 (8.9%)	3 (4.8%)
Complication due to long stay of catheter in the vein	2 (3.6%)	–
<b>Total:</b>	<b>19 (33.9%)</b>	<b>8 (12.7%)</b>

According to the table 1, the most common cause of AIO was mixed out intestinal obstruction (70 patients), and the highest share occupied adhesive (50). Patients received after a day or more from onset of disease were 57%. A direct correlation elapsed between the time from the onset of the disease, the severity of the patients and the pathological changes in the abdominal cavity.

The control group consisted of 56 patients, most of whom arrived to the clinic at the stage prior to this study, or for technical reasons it was not possible to produce transnasal intubation of the small intestine during surgery (massive adhesions in the abdominal cavity, is extremely serious condition of the patient), or for spontaneous removal of sick nasointestinal probes. A nasogastric tube was placed immediately after surgery for all of these patients in order to evacuate the contents of the gastrointestinal tract.

63 patients of the main group of traditional therapeutic measures after the removal of the source of AIO during the operation, have been supplemented: transoral intubation of the small intestine dual-channel plastic probe and performing intraoperative BD. After that, the probe was removed and made transnasal intubation of the small intestine thinner silicon probe the original design, to perform in the early postoperative enteral measures: BD, IL and enterosorption.

In the early postoperative period nasointestinal probe was used for enteral planned measures: BD, IL and enterosorption. The effectiveness of the gastrointestinal tract decompression was evaluated

using the following signs: improving the overall condition of the patient, the absence of abdominal distention and pain, the appearance of intestinal peristalsis, reduce of indicator of intoxication, as well as the improvement of peripheral and central hemodynamics, restoration of basic clinical and biochemical parameters of blood.

IL carried out to improve the passage of the small intestine and the additional-term correction of fluid and electrolyte balance salt solution. According to its electrolyte composition solution was similar to the intestinal chyme. IL started immediately after surgery (the first day), introducing the infusion of 1500 ml. of saline in 4 series (per day) through a small lumen of the probe, with an exposure of 30 minutes followed by aspiration.

In the future, as the improvement of methods of treatment, patients in the terminal stage of the toxic and diffuse purulent peritonitis with a view to further detoxification carried enterosorption. In contrast with the commonly held IL at enterosorption of the saline was added enterosorbent (enterosgele) at the rate of 4 g/kg of patient weight, and the method of its implementation is not particularly distinguished.

This procedure was conducted 3–4 times per day, series, and stopped at least the appearance of water and electrolyte absorption that is an indication for the implementation of the test sample.

The degree of endogenous intoxication was evaluated on the content medium mass molecules in serum, as well as index of leucocyte of intoxication (Kalf-Kalif index). Status of motor activity

of the gastrointestinal tract in the immediate postoperative period was controlled by the X-ray and indicators for the peripheral polelectroenterography G. D. Sobakin on the unit EGS-4m with integrated special filter.

### Results of the research

The most characteristic symptom of AIO in patients from both groups had pain: 62 (52.1%) — severe and constant, in 35 (29.4%) — paroxysmal in 22 (18.5%) — a sharp, constant. Pronounced tachycardia was observed in 100 (84%) patients, fever — in 19 (16%), delayed stool and gas — in 86 (72.3%). Most intestinal peristalsis has been strengthened and had a spastic character (46.2% of cases), sometimes completely absent (24.4%), although sometimes mentioned at the beginning of its gain, and later disappearance (30.3%), bowel sounds. On plain film “bowl” of Kloyber were detected in 83 (69.7%) patients, and single swollen bowel loops — in 36 (30.3%).

Serous fibrinous effusion was registered in 21 patients, the serous — in 18 patients, purulent — at 16. Diffuse peritonitis ascertained in 2 patients in the control group and in 6 patients from the main group, who was received 72 hours after onset of the disease.

Standard complex of treatment used in 3 stages. Correction of fluid and electrolyte balance, acid-base balance, disorders of hemodynamic and respiratory functions of vital organs, taking into account co-morbidities were performed in the preoperative period, as well as measures aimed at eliminating AIO conservatively, which lasted about two hours.

Surgical intervention to remove the cause of intestinal obstruction was performed after failure of conservative treatment in these terms.

Basically surgery was to eliminate the source of intestinal obstruction. In 30 (30.3%) patients the operation ended with bowel resection with restoration of intestinal passage — installed of enteroentero anastomosis “side to side”.

A nasogastric tube was installed for patients in the control group for the gastrointestinal tract decompression. Exudates evacuation, irrigation of the abdominal cavity with antiseptic solutions, novocainisation root of the mesentery of the small intestine and abdominal drainage were carried out in the presence of acute diffuse peritonitis. Abdominal drain was conducted by the method developed in our clinic (by Karimov Sh. I. et al.) for peritoneal dialysis in the postoperative period.

Intensive infusion and antibiotic therapy with the inclusion of parenteral nutrition, gastrointestinal decompression with nasogastric tube were conducted postoperatively. The majority of patients in the control group continued intestinal paresis hampered passive outflow of the contents of the digestive tract, and attempts to active aspiration of single lumen gastric probe proved unsuccessful due to the suction effect of the gastric mucosa, which prevented adequate decompression of the gastrointestinal tract. All this played an important role in the development of specific and non-specific complications in 22.7% of patients.

Preoperative management of main and control group's patients was not significantly different. In contrast to the implemented remedial measures in the control group, 63 patients of the main group of traditional healing activities undertaken during the operation, it has been supplemented: technical support for enteral planned activities both during surgery and in the early postoperative period.

Overall the majority of the main group's patients remained severe due to severe intoxication in the early postoperative period. Drug-induced intestinal stimulation was started on the day after surgery. Nasointestinal probe was connected to active aspiration in the active mode, BD, IL and enterosorption in the early postoperative period. Following the success of the BD series enterosorption

injected into the small intestine 20% enterosgele solution, which after 30 minutes of exposure was removed by active aspiration.

The amount of liquid aspirated during intraoperative BD ranged from 900 to 2700 ml. (mean  $1255.0 \pm 25.5$  mL). A direct correlation was observed between the separated liquid amount from the intestine and the severity of peritonitis.

A similar pattern was also observed at postoperative BD and in the early postoperative period. Thus, in the 1st postoperative day in patients without signs of diffuse peritonitis the amount of separated liquid from nasointestinal probe was  $650.0 \pm 28.0$  ml., 2<sup>nd</sup> —  $240.0 \pm 11.0$  ml. As a rule, on the 2<sup>nd</sup> day after the operation they have seen improvement in general condition, reduced toxicity and the emergence of intestinal peristalsis. The separated liquid from nasointestinal probe became more transparent along with a reduction in its amount, lost stagnant shade, which served as an indication for removal of the probe by the end of 2 days after surgery and transfer to a mild oral nutrition.

The discharge from nasointestinal probe remained high (on the 1<sup>st</sup> day —  $1250.0 \pm 46.0$  ml., on the 2<sup>nd</sup> —  $870.0 \pm 37.0$  ml, on the 3<sup>rd</sup> —  $820.0 \pm 25.5$  ml.) in patients with diffuse peritonitis despite intra-operative lavage and BD. Improvement in general condition of patients observed and the discharge from nasointestinal probe decreased to  $340.0 \pm 27.0$  ml., resistant intestinal peristalsis was detected with a favorable course of the disease by the end of 4 days was. These signs were the indications for removal nasointestinal probe.

The state of the patients progressively deteriorated, it is clinically manifested by persistent manifestations of the IFS and the EIS, the MOF of nasointestinal probe continued to act murky, stagnant secretions, intestinal peristalsis is not listened to, and advancing in 2 (3.6%) patients, death by continuing sluggish peritonitis in cases of unfavorable course of the disease.

Our studies have shown that despite the elimination of the source of AIO and conducted comprehensive treatment of patients in the control group, the use of nasogastric intubation did not allow most patients to carry complete decompression of the gastrointestinal tract intraoperative and early postoperative period. The persistent postoperative intestinal paresis also hampered the passive outflow of the contents of probe despite drugs bowel stimulation and active aspiration did not give effect. Of course, all this affected the results of the treatment of this group of patients.

This was evidenced by persistent intestinal paresis, continuing in the early postoperative period in 19 (33.9%) patients in the control group. Severe endogenous intoxication, electrolyte imbalance also played an important role in the development of postoperative complications (table 1), including such formidable as suture failure and ongoing peritonitis, bowel eventration and enteric fistulas. Mortality in the control group was 7.1% (4 patients died).

The transoral intubation of the small intestine pursued during surgery with active aspiration of the gastrointestinal tract in this group of patients had quite obvious advantages. It let the vast majority of patients to carry complete decompression of the stomach and small intestine. The transnasal intubation of the small intestine with thinner dual-channel silicone probe during the operation and conduction of early postoperative active BD, IL and enterosorption contributed an additional correction of electrolyte metabolism and detoxification by enteral way in the vast majority of patients. We saw earlier recovery of not only the motor activity of the intestine, but also its other functions, even in the presence of common forms of peritonitis due to the implementation of enteral medical actions.

The effectiveness of enteral therapeutic measures in treatment of patients with AIO from the main group shows a significant reduction in the number of postoperative (primarily specific for this disease) complications and mortality.

So, postoperative complications were observed in 8 (12.7%) patients in the study group. The mortality rate was — 3.2% (2 patients died).

#### Conclusion

The complete set of traditional therapeutic interventions, with intra- and postoperative BD, IL and enterosorption is an important step in breaking the chain of pathogenetic IFS

patients AIO. It contributes not only to the prevention of the IFS, and reduction of endogenous intoxication, restoration of bowel function, as well as create conditions for the early activation of patients and reimbursement of energy costs and the need for plastic materials of the body naturally — enteral route. Timely and adequate conduct of enteral treatment measures: intra- and postoperative BD, IL, and enterosorption, represents an important stage of complex treatment of patients with AIO (especially when complicated with peritonitis) and prevention of IFS, reduces postoperative complications from 33.9% to 12.7% and mortality from 7.1% to 3.2%.

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## Assessment of the quality of life of patients with age-related macular degeneration

**Abstract:** This article is dedicated to the study of the quality of life of patients with the help of an adapted questionnaire VFQ-25 in Uzbek language and assessment of complex treatment of early and late manifestations of age-related macular degeneration.

**Keywords:** age-related macular degeneration, anti-VEGF therapy, medotilin, quality of life, questionnaire VFQ- 25.

**Relevance.** Over the last years, there has been a significant growth of interest in the notion «quality of life» (QL) by the representatives of various spheres of medicine, including ophthalmologists, and an increase in the number of publications on this problem [1, 263; 2, 26–29]. A special importance is given to the study

of the QL of patients with age-related macular degeneration (AMD) in Europe and the USA. A steady growth of the number of AMD patients in the world, slow progressive course of disease leading to partial sight and blindness in people over 55 years old certify about medical-social importance of this problem [2, 26–29; 3, 199–201].



The quality of life is an integral indicator of physical, psychological and social state of a patient based on their own sensations [6, 323–334]. To study the QL, a survey among the patients is conducted with the help of general and specialized questionnaires. The QL assessment allows differentially determining the impact of the disease and treatment on the state of the patient taking into consideration factors related and non-related to the disease [7, 2878–2884; 8, 3354–3359]. With the help of the questionnaires, one can assess not only the sensations of the patient with regard to different aspects of everyday life, but also the results of conducted treatment. The questionnaires intended for the patients with eye diseases are used simultaneously with one of the common methods of QL assessment because a universal ophthalmological questionnaire hasn't been created yet. The NEI-VFQ questionnaire is widely used in ophthalmology.

The NEI-VFQ (National Eye Institute Visual Function Questionnaire) questionnaire was developed in mid 90s of the last century by the scientists of the National Eye Institute in the USA to measure the subjective assessment of visual function by the patient. NEI-VFQ consists of 51 questions, which assess the state according to 13 different indicators. Since the answers to a big number of questions require significant efforts, a shortened variant consisting of 25 questions (VFQ-25) was proposed. Currently, a vast experience of application of the given questionnaire during the study of the patients with AMD, proliferative diabetic retinopathy, retinitis of different etiology, glaucoma, cataract etc. has been accumulated [2, 26–29; 3, 199–201; 9, 718–732]. It has been proved that VFQ-25 is sensitive to the changes of acuity of vision as well as ensures precise assessment of changes of the quality of life through time [1, 263; 2, 26–29; 7, 2878–2884].

It is obvious that the orientation to the local population is required when questionnaires are used in different countries. Since the English version of VFQ-25 cannot be used in local conditions, it is a big obstacle for the implementation of the questionnaire in the ophthalmological practice in our Republic.

**Aim.** To assess the quality of life of patients with age-related macular degeneration with the help of an adapted Uzbek version of VFQ-25 questionnaire taking into account the results of the conducted treatment.

#### Materials and methods

60 patients with different AMD forms were examined. There were 20 patients (40 eyes) with initial presentation of AMD (drusen, migration and defects of the retinal pigment epithelium) and 40 patients (80 eyes) with later presentation (geographic atrophy of fovea (20 patients, 40 eyes) and choroidal neovascularization (20 patients, 40 eyes)). The median age of the examined was  $68.4 \pm 5.6$  years. There were 28 men and 32 women. The trial groups were contrasted according to age and sex. The control group consisted of 20 patients of the respective age and sex, socio-cultural and national affiliation without retina or optic nerve pathology.

The groups with initial presentation of AMD and geographic atrophy of fovea were given complex treatment that included antioxidants and lutein-containing drugs for 1 month. The patients with neo-vascular AMD were given treatment consisting of 3 intravitreal injections of ranibizumab with the interval of 1 month between injections. Apart from the above indicated treatment, all patients of both groups were prescribed medotilin in the dosage of 4 ml. intramuscularly once a day for 10 days.

Medotilin is a nootropic drug and a cholinomimetic of central mode of action containing an active substance — choline alfoscerate. After administration, choline alfoscerate splits into

choline and glycerophosphate. Choline takes part in the synthesis of acetylcholine, which is the main neurotransmitter ensuring the realization of cognitive functions. Glycerophosphate is the predecessor of phosphatidylcholine, one of the main phospholipids of cell membranes and myelin, thus, it improves membranous flexibility [4, 151], receptor function and synaptic transmission; activates the structures of reticular formation of the brain. Moreover, choline alfoscerate improves mood, contributes to elimination of emotional instability, irritability and apathy. It possesses clear nootropic, neuro-protective effect, improves receptor function and synaptic transmission, cerebral blood flow, enhances metabolic processes in the CNS. The efficiency of choline alfoscerate was proved in several big trials. Open multi-center clinical study by G. Barbagallo and co-authors [5, 253–269], which included 2044 patients, showed significant improvement of cognitive functions in 71 % of patients after a stroke. The indications for medotilin do not specify the possibility of its use in ophthalmological practice. Nevertheless, the bioethics committee of the Republic of Uzbekistan (order № 6 as of 25.08.2012) approved the conduct of a clinical trial of medotilin on a limited cohort of patients with degenerative and dystrophic eye diseases.

Apart from general ophthalmological examinations, all patients underwent additional QL research on the basis of the adapted Uzbek variant of VFQ-25. As it can be seen in the name, VFQ-25 questionnaire includes 25 questions divided into 12 main sections: general state of health, general assessment of sight, eye pain, visual function of close activity, visual function of distance activity, social functioning, psychological health, role difficulties, dependence on physical assistance, driving, color vision, peripheral vision. All questions of VFQ-25 in the interview format required 10 minutes, at average. Likert scale was used for answers. The obtained figures in every scale were from 0 to 100 points and reflected percentage ratio to maximally possible result. The more points in the questionnaire scale one gets, the better the quality of life is. Based on separate results in all sections, except for general state of health, a total indicator of the test corresponding to the VFQ-25 indicator was calculated. The trials were conducted before and after treatment, after 3 month.

Among co-existent diseases, arterial hypertension prevailed in 50 (83.3 %) patients; obesity was observed in 14 (23.3 %) patients; diabetes was detected in 5 (8.3 %) patients; 6 (10 %) patients suffered from myocardial infarction; 4 (6.7 %) patients had strokes in their anamnesis. Among eye pathologies, initial cataract was revealed in 35 % of cases and pseudophakia in 55 % of cases. Thus, lens opacity as a factor reducing eye sight is minimal.

In the group with neo-vascular AMD, classic choroidal neovascularization was detected in 15 cases; in 12 eyes neovascularization was of occult nature, and of mixed nature in 13 eyes.

#### Results and discussion

The analysis of QL indicators in the control group showed that the points in the scales of VFQ-25 questionnaire fluctuated from 40 to 100, and total indicator was  $82.24 \pm 0.84$ . Mainly (75 %), the examined had difficulties in performance of everyday activities during work at close distance, hence, were worried about their eye sight.

In the patients with early manifestations of AMD, the QL scale indicators were decreased in a less degree ( $61.48 \pm 0.84$ ) compared with other researched groups. In 10 % of cases, the patients assessed the condition of their eye sight as good, satisfactory in 50 % and bad in 40 % of cases. 65 % of patients had concerns about the diagnosis and possible deterioration of the eye sight. They mainly

noted difficulties in sewing, small repairs and decrease in reading activity. However, in this group, the patients had quite an active life style and continued working in 80% of cases.

In the group with neo-vascular AMD, the values of the QL scales were decreased to  $45.12 \pm 1.41$ . According to the results of the questionnaire, regardless the initial acuity of sight, all patients characterized the condition of their health as satisfactory (10%) or bad (90%) and were anxious about further forecast (90%). The next part of questions was about limitations in habitual activity of the patients at different distances. During work at close distance with maximal correction (reading, sewing, small repairs), 60% noted significant difficulties; 25% called it quite difficult; 10% had to give up work at close distance, and only 5% of cases shows insignificant difficulties. At medium distance, 40% noted significant difficulties; 30% called the activity quite difficult; 20% had to give up work at medium distance, and only 10% of patients noted insignificant difficulties in the performance of this activity. At far distance (reading of street signs and boards), 55% called this activity quite difficult; 25% noted significant difficulties; 20% of patients noted insignificant difficulties in performing this activity and 5% had to give it up. VFQ-25 allows assessing the degree of participation of the patients in social life (visiting people, cinema, theaters). In this case, the majority of the examined noted some difficulties; however, their participation in social events was not limited. In the final part of the questionnaire, the degree of psychical assistance as a consequence of eye sight problem was determined: 30% sometimes experience dependence; 30% — often; 25% — rarely; 10% are completely independent and 5% constantly depend on help.

In the group with geographic atrophy of fovea, the values of the QL scales were decreased in a greater degree ( $20.34 \pm 0.91$ ). Regardless the initial acuity of sight, 95% of patients characterized their sight as very bad and as bad in 5% of cases. All patients were anxious about their sight; 40% informed about moderate, dull pain around eyes; possibly, it had something to do with chronic ocular ischemic syndrome. During the work at close distance, 65% of patients stopped work because of eye sight; 35% of patients noted extreme difficulties. During the work at medium and far distance, 15% of patients called this activity quite difficult; 35% noted significant difficulties and 50% had to give up work that required this kind of activity. 20% constantly needed the help of others; 55% — often, and 25% never had dependence. Assessing the results of the questionnaire, it becomes obvious that low acuity of sight leads to low indicators of the quality of life.

A comparative analysis of monitoring of the QL indicator and condition of sight before and after treatment in AMD patients is presented in Tables 1, 2, 3.

The data in Table 1 shows that the median value of the total QL indicator in patients with initial manifestation of AMD after treatment accounted for  $67.09 \pm 0.75$  ( $p < 0.01$ ). Almost all patients noted mood enhancement, subjective improvement of acuity of sight and clarity of what they see as well as increase in physical activity. By the end of the 3<sup>rd</sup> months of observation, they assessed their state as good in 45% of cases, satisfactory in 45% of cases and excellent in 10% of cases. The number of patients with anxiety with regard to further forecast of sight reduced to 15% compared with 65% before treatment. In the section «difficulties in performing everyday activities» related to the ability to see closely and far, the median value of the total score was  $62.38 \pm 1.59$  ( $p > 0.05$ ) compared with  $56.63 \pm 1.76$  before treatment. Apparently, it is determined by the improvement of acuity of sight and light sensitivity after treatment.

Table 1. – QL indicators in patients with early manifestation of AMD

Sections of the questionnaire		Median value in points (M ± m)		
		Before treatment	After treatment	Control group
1	Condition of sight and health in general	65.69 ± 2.38 <sup>#</sup>	75.44 ± 2.05 <sup>**</sup>	69.44 ± 1.85
2	Difficulties in performing everyday activities	56.63 ± 1.76 <sup>#</sup>	62.38 ± 1.59 <sup>*</sup>	84.88 ± 2.04
3	Consequences of sight problems	65.0 ± 1.33 <sup>#</sup>	68.61 ± 1.15 <sup>*</sup>	85.0 ± 1.19
<b>Total score</b>		61.48 ± 0.84 <sup>#</sup>	67.09 ± 0.75 <sup>**</sup>	82.24 ± 0.84

Note: \* — differences are significant compared with the period before treatment ( $p < 0.05$ ); \*\* — differences are significant compared with the period before treatment ( $p < 0.01$ ); # — differences are significant compared with the data of the control group ( $p < 0.05$ ).

The analysis of monitoring of the QL indicator in patients with neo-vascular AMD before and after treatment (Table 2) also revealed a significant improvement in all sections of the questionnaire. Total median value of the QL indicator was  $53.30 \pm 1.18$  ( $p > 0.01$ ). The condition of sight was assessed as satisfactory by 20% of patients compared with 10% before treatment; also, the number of patients assessing their sight as very bad reduced to 40% compared with 55% before treatment. The number of patients with anxiety with regard to their sight reduced to 35%. After treatment, the participation in social life improved to different extent in all patients at the expense of improvement of the acuity of sight and clearness of what they see, due to which the median score of the questionnaire for the first and second sections reached  $45.25 \pm 3.78$  and  $52.88 \pm 2.52$  ( $p > 0.05$ ), respectively. It should be noted that the number of patients who need the help of others due to their sight problems reduced to 20%, whereas this indicator was 35% before treatment. The feeling of dissatisfaction and irritability of the patients was shown in a lesser degree after treatment. In this respect, the median value of the QL indicator for the third section also increased to  $57.36 \pm 1.69$  ( $p > 0.05$ ).

Table 2. – QL indicators in patients with neo-vascular AM

Sections of the questionnaire		Median value in points (M ± m)		
		Before treatment	After treatment	Control group
1	Condition of sight and health in general	33.38 ± 4.49 <sup>#</sup>	45.25 ± 3.78 <sup>*</sup>	69.44 ± 1.85
2	Difficulties in performing everyday activities	44.5 ± 3.01 <sup>#</sup>	52.88 ± 2.52 <sup>*</sup>	84.88 ± 2.04
3	Consequences of sight problems	51.25 ± 2.0 <sup>#</sup>	57.36 ± 1.69 <sup>*</sup>	85.0 ± 1.19
<b>Total score</b>		45.21 ± 1.41 <sup>#</sup>	53.30 ± 1.18 <sup>**</sup>	82.24 ± 0.84

Note: \* — differences are significant compared with the period before treatment ( $p < 0.05$ ); \*\* — differences are significant compared with the period before treatment ( $p < 0.01$ ); # — differences are significant compared with the data of the control group ( $p < 0.05$ ).

In the group with geographic atrophy of fovea, the patients didn't show significant differences in value of the QL score for different sections of the questionnaire after treatment, but there were

significantly high values in the total indicator compared with the period before treatment. Despite the absence of statistical significance of the indicators of visometry in this group, the subjective improvement of the acuity of sight according to the questionnaire data should be explained by their positive psychological state of mind due to medotilin intake. Unfavorable forecast of the deterioration of sight in the later stage of AMD is often accompanied by the changes in psychological state of the patients. At this stage, they always start being concerned about quality of life experiencing fear, anxiety and frustration developing into depression. In our opinion, even a short intake of medotilin reduces depression in patients and improves their general well-being.

We used the criterion of acuity of sight and light sensitivity as the main component of the assessment of state and function of an eye, because these indicators have direct impact on the patient's QL. Assessing the results of the treatment for 3 months, it should be noted that in the group of patients with early manifestations of AMD, the median indicator of acuity of sight with correction increased by 1.4 times and light sensitivity by 1.3 times compared with the initial level; in the group of patients with neo-vascular AMD, these indicators increased by 2 ( $p > 0.05$ ) and 1.3 times ( $p > 0.05$ ), respectively, after treatment. The patients with geographic atrophy

of fovea showed insignificant increase of functional indicators and changes were statistically insignificant (Table 4).

Table 3. – QL indicators in patients with geographic atrophy of fovea

Sections of the questionnaire		Median value in points (M ± m)		
		Before treatment	After treatment	Control group
1	Condition of sight and health in general	29.94 ± 2.72 <sup>#</sup>	37.06 ± 2.20 <sup>*</sup>	69.44 ± 1.85
2	Difficulties in performing everyday activities	13.25 ± 1.68 <sup>#</sup>	14.88 ± 1.66	84.88 ± 2.04
3	Consequences of sight problems	26.25 ± 1.25 <sup>#</sup>	28.75 ± 1.07	85.0 ± 1.19
<b>Total score</b>		21.24 ± 0.89 <sup>#</sup>	24.16 ± 0.83 <sup>*</sup>	82.24 ± 0.84

Note: \* — differences are significant compared with the period before treatment ( $p < 0.05$ ); \*\* — differences are significant compared with the period before treatment ( $p < 0.01$ ); # — differences are significant compared with the data of the control group ( $p < 0.05$ ).

Table 4. – Dynamics of indicators of acuity of sight and light sensitivity in patients with AMD

Groups of research	Indicators of acuity of sight		Indicators of light sensitivity (dB)	
	Before treatment	After treatment	Before treatment	After treatment
AMD with early manifestations	0.62 ± 0.03	0.71 ± 0.03 <sup>*</sup>	11.5 ± 0.7	14.5 ± 0.8 <sup>*</sup>
Neo-vascular AMD	0.28 ± 0.04	0.48 ± 0.03 <sup>*</sup>	6.4 ± 0.5	8.5 ± 0.6 <sup>*</sup>
Geographic atrophy of fovea	0.15 ± 0.03	0.19 ± 0.03	4.5 ± 0.6	5.8 ± 0.7

Note: \* — differences are significant compared with the period before treatment ( $p < 0.05$ ).

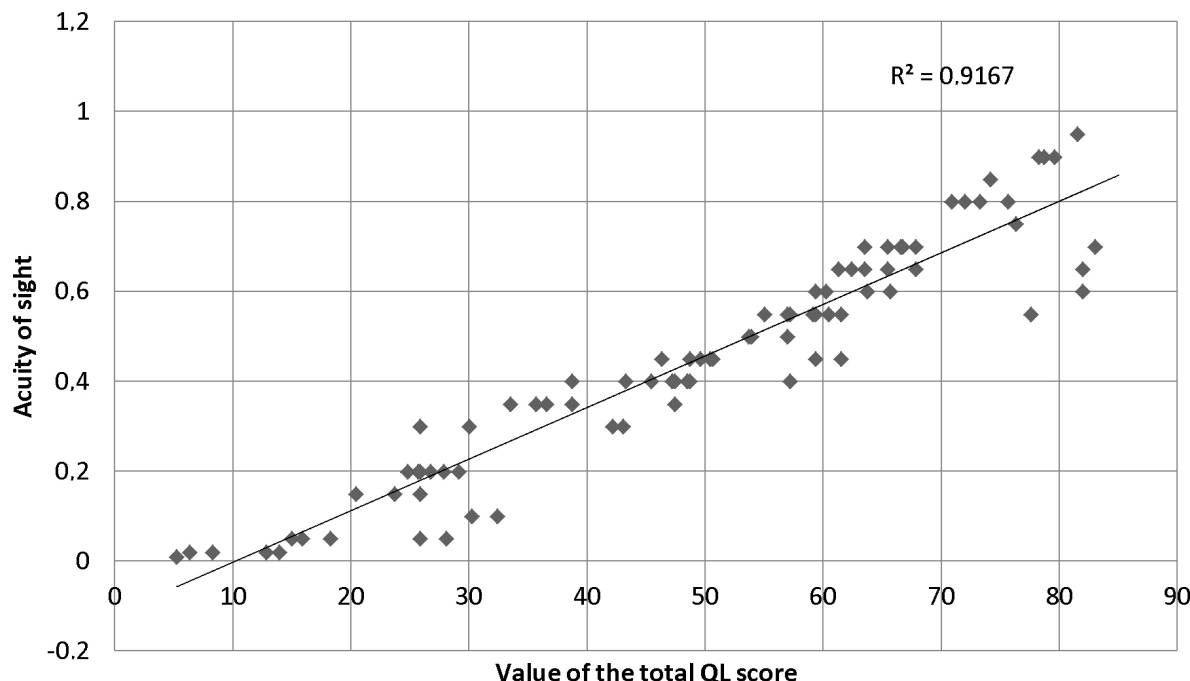


Fig. 1. Correlation between acuity of sight with correction and general score of the QL in patients with AMD

Correlation analysis shown in Fig. 1 revealed the presence of a strong direct (positive) relation between the QL indicators and acuity of sight of patients with AMD ( $R^2 = 0.9167$ ).

Discussing obtained data, it should be emphasized that the presented results certify demonstratively about the reduction of medical-psychological status of the patient in the case of expressed degenerative changes of macular zone of the retina. Undoubtedly,

the presented data can be the subject of many discussions from the point of possible multi-factor impact on the psychological status of the patient. At the same time, expressed, statistically significant differences of the assessed indicators in the researched groups compared with the control group ensure, from our point of view, required correctness and significance of the obtained results. It is especially important to note that, according to the results

of individual interviews, the complaints typical for AMD appeared during the work at close distance (96 % patients) and professional activity (68 %), which is explained by patho-morphological changes of central sections of the retina typical for this pathology. In the majority of cases, the indicators of social adaptation (increased irritability, emotional lability and desire to stay at home) were reduced significantly. Realization of own dependence on others, a feeling of helplessness, according to the assessment of the patients, reduces QL significantly, and the analysis of this indicator allows detecting the way how the disease and its treatment influence all components of normal existence of the man. From our point of view, the expressiveness of complaints typical for AMD consistently reflects significant deterioration of the patient's medical-psychological status and QL in the whole.

### Conclusions

1. Reduction of the QL of the patients with AMD revealed by us is in direct dependence on the indicators of visual functions.
2. Use of medotilin in a complex AMD treatment allows stabilizing socio-psychical health of the patients with significant increase of their QL in combination with significant improvement of clinical-functional indicators of the eye.
3. It is reasonable to include medotilin in a complex treatment of patients with initial and later manifestations of AMD in order to increase their QL.
4. Conducted statistical analysis showed that VFQ-25 questionnaire (in Uzbek language) is valid and reliable, and can be recommended for the purpose of clinical application in ophthalmological practice in the Republic of Uzbekistan to assess the QL of patients with AMD.

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## Analysis of contributing factors and prevent the spread of drug abuse among female contingent population

**Abstract:** The study of the socio-demographic, clinical and biological characteristics of the 82 drug-dependent women in Tashkent, registered municipal narcological dispensary for early 2015. The study identified factors that promote and prevent the spread of drug addiction among the female segment of the population.

**Keywords:** addiction, female contingent of the population, socio-demographic factors.

The urgency of the problem. Considering drug addiction as a disease of complex etiology, with the participation of numerous social, psychological, and biological factors, the researchers emphasize the existence of gender differences in the degree of their influence [5]. Among the causes of drug addiction dominant women called life and family problems [4; 6], the influence of microsocio-

groups [2], personal characteristics, such as the desire for risk and thrill of [3]. Among the biological factors emphasize the role of genetic predisposition [1], as well as purchased on premorbid stage organic disease of the central nervous system.

Compared with other countries, in the Republic of Uzbekistan the share of women among the total number of drug users has always

been relatively small, and it has been steadily declining in recent years. From 2002 to 2015, this figure has decreased from 10.1 % to 3.0 %. In this regard, there was an interest in the study of factors that contribute to or, conversely, prevent the spread of drug addiction among the female segment of the population. It is of exceptional importance to improve approaches to the prevention of drug addiction and its negative health and social consequences.

The venue of the study was elected Tashkent — the central city of the Republic of Uzbekistan, which recorded the highest number of drug-dependent women and their share in the total number of drug users is 1.3 times higher than the national average.

**The purpose of research:** the study of the factors that facilitate and impede the spread of drug addiction among the residents of Tashkent.

#### Material and methods

The object of the study were 82 women contingent of drug addicts among the residents of Tashkent and registered city Narcological Dispensary in early 2015. To analyze the factors that help or hinder the spread of drug addiction, examined socio-demographic, clinical and biological characteristics of the patients.

Among the socio-demographic factors included ethnicity, education level, occupation, marital status before the initiation of drug abuse. The biological characteristics of the assigned age of initiation to drugs, type and method of drug use. In order to forecast the situation were studied clinical and social indicators of drug dependence in women at the time of the study.

Results. Analysis of socio-demographic factors showed that the distinguishing feature of the female population of drug users in Tashkent is a multi-ethnic composition. Moreover, the ethnic Uzbek persons amounted to only 25.6 % of the number of drug-dependent women with reliable prevalence (74.4 %;  $P < 0.05$ ) of other nationalities. Among them, 46.3 % were persons of Slavic (Russian, Ukrainian), 10.9 % — Tatar, 6.1 % — the gypsy. For all other nationalities (Georgians, Armenian women, Uigur, Koreans, Kazakhs and others.) In total accounted for 11.1 %.

The level of education among women in general was low. Most of them have only primary — 7.3 %, or secondary (high school) — 61.0 % education. Persons with special secondary (24.4 %), incomplete higher (1.2 %) and the highest (6.1 %), education accounted for a much smaller percentage of drug users ( $P < 0.05$ ). In other words, before the initiation of drug abuse only 30.5 % of women had a certain profession.

Before exploring the drug 54.8 % of women did not work. Of these, only 6.1 % purposefully dedicated themselves to the household. The remaining 48.7 % ( $P < 0.05$ ) had no definite occupation. Among the 45.2 % of working women dominated persons employed in the service sector (14.6 %), engaged in unskilled labor (8.5 %) and trade (10.9 %). On a more skilled activities (work in education and educational, medical and other institutions), including private business, had 10.0 %. Students of higher education institutions was only 1.2 %.

The study of marital status showed that before the drug vast majority of women (57.3 %) did not have their own family. Of these, 40.2 % were single women, which are dominated by persons under the age of 20 years (21.9 %). Attention is drawn to a high enough percentage of divorced (14.6 %), 2.4 % were widows. Held in marital relationships (including unmarried) 42.7 % ( $P > 0.05$ ) women. The proportion of women with children (58.5 %), significantly higher than the proportion of women who are married. 15.8 % of women before initiation of drug abuse alone engaged in the upbringing of children born out of wedlock.

Some women (9.7 %) before the drug had been convicted of various offenses, of which 50 % were engaged in selling drugs.

Studying the role of environment in mikrosotsialnogo admission of psychoactive substances found that familiarity with the drug in the vast majority of women (81.7 %) occurred under the influence of friends (51.2 %) or in the company of friends (30.5 %). Attention is drawn to a sufficiently high frequency (14.7 %) of women's involvement in drug use from relatives (husband, common-law partner, brothers). Much less often (3.6 %), the first drug reception took place under the influence of random factors (in a bar, a disco, etc.). The motive for the first trial of the drug often served as a curiosity, excited by women drug users from among persons mikrosotsialnogo environment.

It should be noted that most of the women (85.4 %) were involved in drug consumption in the period from 1985 to 2006, the peak of the spread of drug use accounted for 1998–2000 (1997 — 7.3 %, 1998 — 8.5 %, 1999 — 10.9 %, 2000 — 13.4 %). Prior to 1990, used drugs, 7.4 % of women. In the period from 2007 to 2012 gained access to drugs is only 14.6 % of the patients.

Analysis of clinical and biological factors testified about the beginning of the most frequent drug use in young (under 30 years), age (71.9 %). Most of the first dose of drug cases were in the age range from 21 to 30 years (45.1 %). An introduction to drugs in adolescence and early adulthood (up to 20 years) occurred less often (26.8 %) than the age of 30 years (28.1 %). Attention is drawn to a large enough percentage of women who try drugs for the first time over the age of 35 years (13.4 %).

Characteristically, the majority of women from the first time resorted to the most dangerous method of drug use, mainly opioid series. The vast majority of the first in the life of a narcotic drug turned out to be heroin (66.5 %) and other opiates (15.8 %), most often cooked artisanal. Only 17.1 % ( $P < 0.05$ ), women start dating a drug smoking hemp products, and 0.6 % — to receive psychostimulants ("ecstasy") from outside the country. At the time of the first dose of opiates 39.6 % resorted to the intravenous route of administration, 32.9 % — by inhalation, 4.9 % — to the reception inside, and 4.9 % — for smoking. The injection method of use has contributed extremely rapid formation of addiction with the subsequent transition to the regular intake of the drug.

The general experience of anesthesia at the time of applying for medical assistance ranged from 3 months to 27 years. It is characteristic that most of the women were found in the early stages of the disease. So, with the experience of drug use no more than 3 years of registered 67.2 % of women and 29.3 % in the duration of anesthesia does not exceed 1 year. The proportion of women with experience of drug abuse more than 3 to 5 years was 12.2 %, more than 5 to 9 years — 10.9 %, 10–15 years — 7.3 %, more than 15 years — 2.4 %.

By the time of recourse 80.6 % of women had been addicted to heroin, 3.6 % — from homemade cooked opium drugs, 6.1 % — by cannabinoids, 9.7 % — polysdependence by opiates and cannabinoids. At 2.4 % of women at this point there was a state of remission with complete abstinence from drug use.

In order to assess the dynamics of the state of women drug addicts under the influence of therapeutic intervention has been studied for their clinical and social characteristics on 01.01.2015 year.

The patients' age at the time of the study ranged from 25 to 57 years old. Persons under the age of 30 years accounted for only 10.9 %, over 30 years old — 89.1 % ( $p < 0.05$ ) of those aged 31 to 40 years — 43.9 %. The vast majority of women were between the ages of 41 to 57 (45.2 %). On 01.01.2015, the continued

drug use 35.5 % of women. At the same time receiving the original drug continued to 10.2 % of patients switched from opiate use to cannabinoids — 3.6 %, for alcoholic beverages — 19.3 %, to drugs (sedative-hypnotic group) — 2.4 %. In 2014, 4.8 % of women, who at the time of the study were in the prisons have been convicted.

The remaining 64.5 % of women completely stopped taking psychoactive substances. Moreover, remission occurred in 3.6 % up to 1 year over 1 year to 2 years — in 12.2 %, more than 2 years — from 48.7 % ( $p < 0.05$ ) patients. By the time of the study, 19.5 % of women diagnosed HIV-positive, 1.2 % — in the period of drug transferred sexually transmitted diseases.

The study of the social characteristics showed that the never married 39.1 % of patients were in married or cohabiting — 43.9 %, divorced — 14.6 %. Widows were 2.4 % of patients. 52.4 % of women did not work, preferring in remission do housework, 3.6 % — drawn up on the old-age pension. Compared with the premorbid phase proportion of women (30.5 %) at the time of the study was reduced by only 2.4 %.

Thus, the study of the socio-demographic characteristics of the female contingent of addicts in Tashkent showed that before the drug most women were influenced by a variety of adverse social factors that impede full coping and creating conditions for the initiation of drug abuse as the most easy way of avoiding life's difficulties. These factors include the lack of a specific profession

and occupation, unsettled personal life, the negative impact mikrosotsialnogo environment.

The study of the chronology of initiation to drugs showed that the highest number of women was involved in drug use at a time when the spread of drug abuse in the Republic of Uzbekistan was of epidemic with the rapid increase of the primary indicators and the overall incidence of drug abuse among the general population. More frequent involvement in drug use residents of Tashkent city as compared to other regions could contribute to their multi-ethnic composition, reducing the positive role of the patriarchal family order and features of education, characteristic of the indigenous population of the republic.

Mostly young age of initiation of drug abuse, the use of opioids with the highest narcogene (heroin), initially inject able route of administration contributed to the rapid development of drug dependence.

Identifying drug at a relatively early stage of the disease, timeliness and regularity of therapeutic intervention had a significant impact on the effectiveness of drug treatment to women, providing a fairly high percentage of stable remission and preventing the reduction of social adaptation of patients. The lack of a significant influx of young women drug addicts, "aging" of patients, the tendency to change their behavior towards the discontinuation of opioids suggest a further decline in the proportion of women among the total number of drug addicts registered in Tashkent.

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## Non-epithelial malignant tumors neck, features of clinical current and treatment

**Abstract:** In this article were studied features of clinical current and treatment results of malignant non-epithelial tumors of the neck. During the 2003–2012 yy. We treated 28 patients with malignant non-epithelial tumors of the neck. Of the 28 patients, complex treatment were 14 (50 %) patients, combined treatment carried 8 (28.5 %) patients, of whom 6 (21.4 %) patients received chemo-radiation therapy and in 2 (7.1 %) patients underwent surgery and radiation therapy, 4 (14.3 %) patients received chemotherapy, and 2 (7.1 %) patients underwent symptomatic treatment. Results: The immediate results of neoadjuvant chemo-radiation therapy were partial response was observed in 11 (39.2 %) patients, stabilization in 2 (7.1 %)

patients, tumor progression observed — in 2 (7.1 %) patients. Surgical treatment is among the complex and combined treatment was performed in 16 (57.1 %) patients, while in 6 (21.4 %) patients with cervical limfodisektsiya was performed, Crile surgery in 2 (7.1 %) patients, the removal of soft tissue tumors of the neck in 8 (28.5 %) patients. **Conclusion:** Effective treatment is required in defining the histological nature of the tumor and on the basis of neoadjuvant chemo radiotherapy and surgery.

**Keywords:** non-epithelial malignant tumors of neck, surgery, sarcoma, chemotherapy.

### Introduction

Sarcomas are malignant neoplasms originating from mesodermal tissues that consist connective tissues of the body [1]. They are rare group of malignancies that consist less than 1 % of body's tumors, including the head and neck region [2–5; 16]. 5–15 % of adult sarcomas are in the head and neck region, while 20 % of them arise from bones and cartilages and 80 % arise in soft tissues [3; 6–9; 18]. Of soft tissues sarcomas, 80–90 % affect adults and 10–20 % are seen in children [6]. In head and neck region, based on histological subtyping 50 % of sarcomas are: osteosarcoma, rhabdomyosarcoma, malignant fibrous histiocytoma, fibrosarcoma and angiosarcoma [6].

### Staging

Staging conducted by the American Joint Committee on Cancer (AJCC) and the International Union Against Cancer (UICC). At the same time it puts the TNM system for soft tissue sarcomas based on tumor size, lymph node involvement and distant metastases [11].

### Clinical presentation

Soft tissue sarcomas, as a group, show a biphasic age distribution — 80 % to 90 % affect adults, whereas 10 % to 20 % are seen in the pediatric age group. Age is an important determinant of histological type of soft tissue sarcoma [10].

More than 80 % of patients with major and the only initial sign of the disease is the presence of a clinically defined tumor. When neuromas may be a neurological disorder associated with compression or irritation of the nerves, of which the tumor develops.

Pain could be present occasionally and it is the most common presenting symptom in bone sarcomas [12]. Carotid chemodectoma occurs at the site of the carotid glomus location (bifurcation of the carotid artery). The development of tumors can sometimes cause headaches, dizziness, short collaptoid state when pressed. Auscultation over the tumor vascular sometimes the noise can be determined. Sarcomas neck characterized by more rapid growth, lymphogenous (neurogenic sarcoma, malignant Sinovioma and chemodectoma) and hematogenous (neuroblastoma, poorly differentiated liposarcoma) metastasis.

### Treatment of head and neck sarcomas

The classical treatment modalities employed in head and neck sarcoma are: surgery, radiotherapy and/or chemotherapy. Treatment of sarcomas is dictated by tumor type, stage, location, size and patient age [13]. Due to the anatomical complexity and surrounding vital structures in the head and neck region, wide excision with adequate margin is not possible in all cases. Resection of gross tumor with post-operative adjuvant therapy is the treatment in most cases [14; 16].

### Surgery

Adequate surgical excision is not applied in some sarcomas of the head and neck because of the complex anatomy and close proximity to major structures vital to the primary tumor.

When the surgical margins are not adequately free, post-operative radiotherapy and/or chemotherapy should be considered [10]. Lymph node metastasis from primary sarcoma in head and neck is more with embryonic rhabdomyosarcoma, epithelioid sarcoma, clear cell sarcoma, synovial cell sarcoma and vascular sarcoma [14]. The presence of nodal metastasis is a clear signal of distant micro-metastasis [10].

### Chemotherapy

Soft tissue sarcoma in head and neck region responds very well to chemotherapy as their counterparts in other parts in the body [15]. It provides improved local control especially if combined with radiation therapy where wide excision is not possible. It is also indicated for high-grade soft tissue sarcomas along with radiation therapy and surgery [14]. Pre-operative chemo-radiotherapy has been tried to shrink large soft tissue sarcomas specially those near vital structures prior to surgery [15].

**The purpose of our work:** the analysis of the clinical picture and treatment of non-epithelial malignant tumors of the neck.

### Materials and methods

We in the department of the National Cancer Research Center of head and neck tumors (RCRC) Ministry of Health of Uzbekistan for the period 2003–2012 yy treated 28 patients with malignant non-epithelial tumors of the neck. The age of patients fluctuated from 14 to 79 years, the average age is 40 years, of which 17 men (61 %), 11 women (39 %). According to the morphological structure, see table 1.

Table 1.

№	Morphology	The number of patients n = 28	%	
1	Fibrosarcoma	14	50	
2	Neurogenic tumors (5)	Neyrosarkomy	3	10.7
		Malignant paraganglioma	2	7.1
3	Angiosarcoma	5	17.8	
4	Rhabdomyosarcoma	2	7.1	
5	Synovial sarcoma	1	3.5	
6	Giant cell tumor with malignant course	1	3.5	

We can see in from the table on the frequency of occurrence of the most in 14 (50 %) patients with histologically is confirmed fibrosarcoma, followed by the occurrence detected neurogenic tumor and angiosarcoma.

Duration history before the first visit to a doctor oncologist is from 1 to 15 months. The average time from the onset of the disease up to 1 visit to a doctor of the patients was 3.5 months. Duration history before entering the RCRC average period was 8 months.

When patients are treated in the Cancer Research Center in 17 (60.7 %) had a primary, in 11 (39.2 %) patients had recurrent tumor, which are mainly treated in local Regional Oncology Center and other medical institutions.

The rate of tumor growth in the last 10–15 days increased in 1 (3.5 %) patient in the last month in 10 (35.7 %), over the last 2–3 months in 6 (21.4 %), over the last year 6 (21.4 %). At the others 5 (17.8 %) patients with tumor growth observed over

long periods. The onset of the history in 1 (3.5%) patients after injury, in 4 (14.2%) patients the disease started after a cold island of respiratory viral infections and the others tumor appeared independently.

In the history of conservatively treated: a neurologist 1 (3.5%) patient, the therapist 3 (10.7%) patients witch doctor — (folk healers) 1 (3.5%) patients, several experts 4 (14, 2%) patients with maxillofacial surgeon 2 (7.1%) patients, in 2 (7.1%) patients underwent physiotherapy. From history to appeal to the RCRC were carried operations in 7 (25%) patients in the regional oncological dispensaries, clinics, maxillofacial surgery in 1 (3.5%) patients.

Tumor size at admission to treatment was 18 (64.2%) patients from 5 × 4 up to 12h13 see average tumor size was 6.1h7.8 cm.

On palpation of the tumor in 19 (67.8%) patients had pain, pain the others patients did not notice it. In 2 (7.1%) patients with palpation tumor was mobile, in 7 (25%) patients the tumor was inactive in 12 (42.8%) patients the tumor was fixed. The consistency of the tumor: in 17 (60.7%) patients with tumor palpation was a the dense consistency in 3 (10.7%) patients had an elastic, 8 (28.5%) patients had a tightly-elastic. The boundaries of the tumor in 6 (21.4%) patients were clear in 15 (53.5%) patients had no clear boundaries.

Status of regional lymph nodes palpation in 13 (46.4%) patients were increased, of whom 10 (35.7%) patients with regional metastases were confirmed by the instrumental and morphological examinations. Moreover metastases from 10 patients detected in the submandibular region in 2 (20%) patients, the upper deep cervical lymph nodes 6 (60%) patients and 2 (20%) patients with other parts of the neck. In 9 (90%) patients with metastases in the neck were unilateral, bilateral metastases were in 1 (10%) patients.

The average size of metastases to the neck was 1.5 cm. Single metastases in 3 (30%) patients with multiple metastases in 7 (70%) patients were found. Distant metastases appeared after the initial treatment in the liver in 1 (3.5%) patients (28 patients). The lungs in 2 (7.1%) patients (28 patients) in the spine 1 (3.5%) patients (28 patients).

Considering the complexity determining the differentiation of soft tissue sarcomas of the neck we could not classify these tumors at stages of the process and the TNM system. However, depending on the tumor size of more than 50% of patients had locally advanced tumor process in nature.

Instrumental examination of MSCT and MRI in 19 (67.8%) patients, UTT all patients were conducted. For cytology needle biopsy was performed in 18 (64.2%) patients, the smear imprints tumor was taken in 4 (22%) patients, which was ulcerated tumor surface. When cytology were found in 8 (44%) patients with malignant cells of origin, in 2 (11%) patients with malignant cell sarcomatous character in 1 (5.5%) patient cells with dysplasia grade 3.

A biopsy was performed in 19 (67.8%) patients, of whom 16 (84%) patients underwent incisional, in 2 (10.5%) patients ekt-sizion in 1 (5.3%) patient trephine biopsy, and 9 (47%) patients underwent removal of the tumor to the residence.

### Results

Of the 28 patients, complex treatment were 14 (50%) patients, combined treatment carried 8 (28.5%) patients, of whom 6 (21.4%) patients received chemo-radiotherapy and 2 (7, 1%) patients underwent surgery and radiation therapy, 4 (14.3%) patients received chemotherapy, and 2 (7.1%) patients underwent symptomatic treatment.

Surgical treatment is among the complex and combined treatment was performed in 16 (57.1%) patients, while in 6 (21.4%)

patients with cervical limfodisektsiya was performed, Crile surgery in 2 (7.1%) patients, the removal of soft tissue tumors of the neck 8 (28.5%) patients. At the same time the internal jugular vein resection was performed in 3 (10.7%) patients. Before contacting our center in the regional oncological dispensaries and other medical facilities in 6 (21.4%) of patients with non-radical treatment is performed.

Time of recurrence of the tumor after surgery, which was carried out on a residence the average time is about 2–3 months after surgical treatment in RCRC average time of recurrence of the tumor consisted of 30 months.

In 3 (10.7%) patients for disease recurrence was on average 2–3 times. With continued growth or recurrence of the tumor, if the tumor was resectable state performed surgical removal of tumors, chemoradiotherapy was performed at unresectable state.

The reason for not carrying out surgery on patients with primary focus was the refusal of the operation and because of of elderly, concomitant disease, unresectable disease and other causes.

Chemotherapy held in the neoadjuvant mode RCRC in 9 (32.1%) patients in the CCCs in 4 (14.2%) patients. Adjuvant chemotherapy was performed in 5 (17.8%) patients.

Chemotherapy scheme was different depending on the histology of the tumor in this scheme — CAP + Cisplatin Doxorubicin, Cyclophosphamide + intravenous chemotherapy was performed in 4 (14.2%) patients, according to the scheme Doxorubicin + cyclophosphamide + vincristine + prednisone in 14 (50%) patients, according to the scheme + doxorubicin + ifosfamide Mesna in 1 (3.5%) patients, gemcitabine + docetaxel in 5 (17.8%) patients.

Radiation therapy was performed in 22 (78.5%) patients in various combinations. Simultaneously, tumor metastasis and neck held in 2 (7.1%) patients. Adjuvant radiotherapy was performed in 7 (25%) patients. Radiation therapy to tumor recurrence was performed in 4 (14.2%) patients, relapse metastasis in 1 (3.5%) patients.

Neoadjuvant radiotherapy remote gamma therapy single dose 3 cGY, total dose — 40 cGY. average fraction was performed in 7 (25%) patients, remote gamma therapy single dose — 2, total dose — 30–40 cGY. Fractionally extended performed in 2 (7.1%) patients, remote gamma therapy — single dose 2.5 Gy, total dose — 40 cGY. Fractionally extended performed in 3 (10.7%) patients. Adjuvant radiation therapy was performed before 40 cGY in 4 (14.2%) patients. In combination with other techniques in 4 (14.2%) patients.

The immediate results of neoadjuvant chemo-radiation therapy were partial response was observed in 11 (39.2%) patients, stabilization in 2 (7.1%) patients, tumor progression observed — in 2 (7.1%) patients, the remaining patients received chemo-radiotherapy in the community, and in our center surgery was performed and some received chemo-radiation therapy after the surgery, so the immediate results of the treatment was impossible to define.

When studying the characteristics of the operations, radical surgery was performed in 10 (35.7%) patients, relatively radical surgery was performed in 1 (3.5%) patients. In 5 (17.8%) patients underwent surgery in the regional oncologic dispensary or in other clinics. Surgery for recurrent tumor — the primary locus (after treatment) was performed in 6 (21.4%) patients.

The general condition of the patient at discharge by ECOG scale in 21 (75%) patients had score 1, 5 (17.8%) patients had ECOG scale 2 points in 2 (7.1%) patients had ECOG status of the scale 3 score.



The wound healed in the primary hearth of was traced in 16 patients without complications, and 1 (3.5%) patients with local complications, failure of the wound edges in 1 (3.5%) patients. In 3 (10.7%) patients after operation was observed regional recurrence of the primary tumor. The treatment was carried out under the CRC on the tumor recurrence in 6 (21.4%) patients who were initially operated at Regional Oncology Center.

#### Discussions

Neck sarcomas are characterized by a rapid pace of growth of the tumor, and according to our data for the last 1–3 months in 51.1% patients had relapses. These findings are consistent with data Podvyaznikova in which malignant non-epithelial tumors of the head and neck is characterized by high relapse rate (64.8% and 45.4% respectively). Metastases to regional lymph nodes in the localization of tumors in the head totaled 29.4%, while localization in the neck region — 12.0%.

Distant metastases were detected more frequently in the localization of tumors in the neck than in the head region (21.3% and 17.6%, respectively) [1].

According to the morphological structure of the most commonly diagnosed fibrosarcoma in 14 (50%) patients. Two factors that play an important role in the survival in sarcomas, head and neck, it is locally advanced tumor and the presence of distant metastases. The size of the primary tumor is not correlated with the local outcome. Light is the most common site of distant metastases of sarcomas of the head and neck. Prognosis: The 5 years survival rate for head and neck sarcoma is between 49 and 55% [14; 15].

#### Conclusion

To be effective, treatment should determine the histological nature of the tumor and on the basis of is expedient conducts neoadjuvant chemo-radiation therapy and surgery.

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## Medical and surgical activities carried out in simultaneous pathology (combination of gynecological and surgical pathology) in women

**Abstract:** Numerous studies in recent years indicate not only the wide dissemination of simultaneous abdominal diseases, but unsatisfactory results of treatment of these diseases. In addition, a one-time surgical treatment of patients with two or three abdominal diseases is complex and not completely solved the problem.

**Keywords:** laparoscopic operation, simultaneous pathology, surgical pathology.

### Background

Numerous studies in recent years indicate not only widely distributing simultaneous diseases of the abdominal cavity, but unsatisfactory results of their treatment. In addition, the cross-sectional operative treatment of patients with two or three abdominal disease is a complex and unsolved problem [1; 2].

The ubiquity of endoscopic surgery has provided a unique opportunity to redefine the boundaries of two disciplines — gynecology and surgery as operative laparoscopy not only equivalent, but preferred classical treatment [5; 6].

The literary data give rare information on this topic, although in practice, many gynecologists and surgeons point out the need for such operations.

In this context, the aim of our work was the improvement of the methods of combined surgical treatment of diseases of the pelvic and abdominal cavity.

### Materials and methods

The research is based on analysis of results of surgical treatment of 200 patients with different concomitant diseases of the abdominal cavity, which was carried out a simultaneous surgery.

Patients were divided into two main groups: the first 107 patients who underwent laparoscopic and traditional simultaneous operations (study group), the second group — 93 patients with conventional surgery (control group), to which was performed one isolated operation (fig. 1).

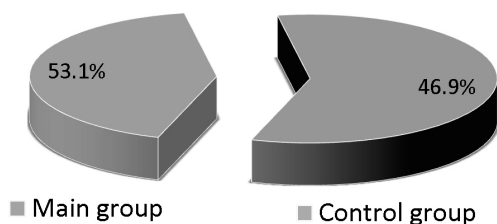


Fig. 1. Main and control group ratio

It was done a comparison of surgical approaches during simultaneous operations.

The average age in the study group was  $38.6 \pm 6.6$ , while in the control group,  $41.3 \pm 5.9$  years. It should be noted that all the patients were in the most active working age.

In the study group of 107 patients who underwent laparoscopic procedures performed simultaneous 47 (43.9%) accounted

Table 1. – The combination of the operations in the main group

Volume of operation	Number of patients	%
Laparoscopic cholecystectomy + laparoscopic hysterectomy	47	43.9
Minilaparotomic cholecystectomy + laparotomic hysterectomy	40	37.4
Transvaginal hysterectomy + Umbilical herniotomy	20	18.7
<b>Total</b>	<b>107</b>	<b>100</b>

for calculous cholecystitis — chronic calculous cholecystitis was 40 (85.1%), acute in 7 (14.9%). In chronic calculous cholecystitis with minilaparotomic access cholecystectomy was performed to 40 patients (37.4%), with the full and partial prolapse of uterus performed transvaginal hysterectomy 20 (18.7%). Laparoscopic simultaneous stage of surgery was hysteromyoma in 47 patients. In addition, the study group is characterized by performing a combination of traditional and minilaparotomic operations.

So, simultaneous traditional stage of operations to calculous cholecystitis was hysteromyoma of different localization in 40 women, also with transvaginal hysterectomy simultaneous stage was herniotomy of umbilical hernia in 20 patients.

The control group (control) consisted of 93 patients with gynecological and surgical pathology, which were performed by a single operation (hysterectomy, ventroplastics, cholecystectomy) in benign diseases (hysteromyoma, endometriosis, prolapse of the vaginal walls, chronic cholecystitis or umbilical hernias).

All patients were examined and prepared for surgery on an outpatient basis. Clinical examination of patients included a general analysis of blood and urine tests, blood chemistry, ECG, chest X-ray, ultrasound of the pelvic organs, the liver and gallbladder. Ultrasound of the gallbladder and the liver was carried out in order to avoid stones in the gallbladder, cyst and other entities in the liver. Particular attention was paid to the degree of purity of the vagina, which must comply with I–II degree.

### Results and discussion

For 2010–2015y was performed 5120 laparoscopic procedures, including simultaneous 107 (2.1%) (Fig. 2).

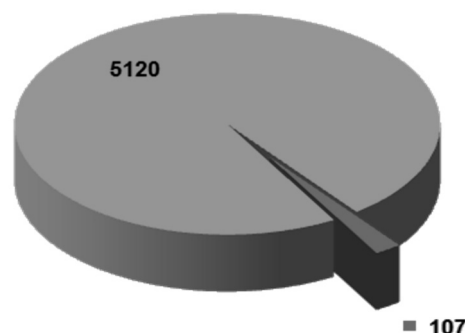


Fig. 2. Ratio of simultaneous operations to total laparoscopic surgery

In the control group, all patients were carried out only isolated operations: hysterectomy — 33 (42.3%) patients, transvaginal hysterectomy — 21 (26.9%), cholecystectomy — 11 (14.1%) and ventroplastics — 13 (16.7%), i. e. the same as those performed in the main group and also by classical techniques, but one operation in each patient.

Table 2. – Isolated operation in the control group

Volume of operations	Number of patients	%
Hysterectomy	33	35.4
Transvaginal hysterectomy	21	22.5
Prolapse of the vaginal walls	15	16.3
Cholecystectomy	11	11.8
Ventroplasty	13	13.9
Total	<b>93</b>	<b>100</b>

The question of carrying out of simultaneous operations was solved by consultation with the participation of doctors, department heads, as well as with the participation of professors, associate professors and assistants of the Department of Surgery of Postgraduate Medical Faculty and Department of Obstetrics and Gynecology, Faculty of Pediatrics of SamMI.

Laparoscopic cholecystectomy + laparoscopic hysterectomy performed in 47 patients. Laparoscopic cholecystectomy was performed by the standard method: to enter a 10 mm. trocar through the navel, and then under the control of the laparoscope introduced two 5 mm. and one 10 mm. trocar in the right upper quadrant on the anterior axillary, clavicular and the middle of the median line. With monopolar coagulator allocated cystic duct and cystic artery, hemostasis is carried out using a bipolar coagulator and the drug was removed from the abdominal cavity through a midline incision.

After completing the cholecystectomy laparoscope unfolded to 180°, patient converted from Fowler position into the Trendelenburg position and performed the inspection of the pelvic organs. Laparoscopic hysterectomy with appendages about hysteromyoma in 47 cases was a simultaneous step to laparoscopic cholecystectomy. For such operations, the selection of patients was carried out carefully (uterine size of less than 12 weeks of pregnancy, a history of uncomplicated term delivery, no last transferred laparotomy and as a result the presence of severe adhesion process, the absence of an inflammatory process in the gall bladder and genital organs).

The fixation of the uterine cervix and cervical canal dilatation was performed with the help of the uterine manipulator of Clermont-Ferrand to ensure the position of the uterus in anteversio and certain provisions of the posterior fornix of the vagina between the sacro-uterine ligaments. Ureters isolated on both sides transparietally from the middle of the posterior leaf of broad uterine ligament. Uterine artery isolated transparietally and using high-frequency coagulator AVTOKON 350 with monocoagulation coagulated in the «spray coagulation» mode at t3 coagulation effect (stage 3). Resection of the round ligament of the uterus, pelvic and sacro-uterine ligaments also performed using monocoagulation. Dissection and relegation of plica vesico-uterina carried out by sharp and blunt ways with scissors to identify the vagina. Clipping of uterine neck from fornix of vagina performed in the «anatomical area» of uterine manipulator of Clermont-Ferrand.

Then removed the uterus with appendages through the vagina and sutured it outside with nodal catgut sutures. Peritonization was not produced. After surgery was held sanation of the abdominal cavity, a thorough inspection and hemostasis of the surgical field and its drainage. The postoperative period in 1 (0.5%) patient was

complicated by the expiration of bile from the stump of the cystic duct. Performed relaparoscopy and the imposition of additional titanium clips. There were no deaths.

Minilaparotomic cholecystectomy with calculous cholecystitis and a simultaneous laparotomic hysterectomy was performed in 40 patients. For these operations, used a set of surgical instruments designed by M. I. Prudkov. A set of tools for minilaparotomy includes: round-support for fixing the mirror-retractor (retractor), mobile narrow mirrors, one of which is equipped with a point light source, connected via fiber with fiberoptic illuminator. Minilaparotomic cholecystectomy was performed with access through pararectal incision, the incision length not exceeded 6 cm, which was enough to secure manipulation in the area of hepatic-duodenal ligament. Laparotomic hysterectomy was carried out in the usual manner on the Pfannenstiel incision. Duration of operations increased compared with laparoscopic surgery  $20 \pm 1.2$  min. Blood loss was within the range of 120–150 ml. In 1 (0.5%) patients developed early postoperative parenchymal bleeding from the vagina stump in the postoperative period. It was made relaparotomy — ligation of the internal iliac arteries. The postoperative period was uneventful. There were no deaths.

Greatest interest is the combination of transvaginal hysterectomy and umbilical hernia. This pathology was in 20 patients. Indications for these operations was complete uterine prolapse and urinary incontinence during tension, prolapse of the vagina and the presence of umbilical hernia. The operation started with herniotomy, because the presence of postoperative infection in umbilical wound can lead to recurrent herniation. Then performed hysterectomy through the vagina by Stäckel method.

In the control group, all patients were carried out isolated operations: hysterectomy — 33 (35.4%) patients, transvaginal hysterectomy — 21 (22.5%), the front colporrhaphy and posterior colpoperineoplasty — 15 (16.3%), cholecystectomy — 11 (11.8%) and ventroplasty — 13 (13.9%), i. e. the same as those performed in the main group and also by classical techniques, but one operation to each patient.

Comparative study of two statistically comparable groups of patients who performed simultaneous and single operation, by clinical and laboratory studies have shown that the body of the patient doesn't change significantly, after the simultaneous interventions.

Determining the degree of blood loss in the main and control groups showed that in the main group during simultaneous operations blood loss was  $94.4 \pm 11.7$  ml. and in the control group blood loss during surgery  $85.4 \pm 16.4$  ml. The above mentioned clearly shows, that the difference in blood loss during simultaneous and isolated operations is negligible.

Our experience of performing simultaneous gynecological laparoscopic operations completely performed by laparoscopic method and combined with conventional accesses reveals the advantages of the method primarily due to less traumatism and cosmetic effect. Therefore, choosing the access, recently we start from being able to perform any operation or stage with any less traumatic way, whether laparoscopic or mini access.

When comparing the surgical approach the use of laparoscopic techniques has reduced the traumatism of access — incision length up to 1 cm. at both stages of laparoscopic surgery. Incision length was identical (12–13 cm.) in main and control groups during simultaneous operations with laparotomy access.

The total duration of the operation in the main group was  $87.13 \pm 13.2$  min., and in the control group  $77.13 \pm 11.1$  min. During the laparoscopic simultaneous operations total operative time decreased by an average of 21 minutes.

Thus, with high professionalism and experiences of operators, as well as highly skilled anesthetic and intensive care provision simultaneous surgery in gynecology and surgery through the classic and

combined accesses can take its rightful place in department practice, as far as they don't represent a great danger for patients and positively perceived by them while adhering above-mentioned conditions.

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## Hemodynamic performance and tolerance to physical activity in women with rheumatic heart diseases

**Abstract:** We have studied the parameters of central hemodynamics in relation to the physical activity tolerance in women with rheumatic heart disease. The increase of the depth and severity of the valve apparatus lesions is associated with an increase of functional class of heart failure. In pregnant women with rheumatic heart diseases, the heart failure signs develop on the background of minimal changes of linear and volumetric parameters of the myocardium, which does not exceed the normal limits.

**Keywords:** pregnancy, rheumatic heart disease, heart failure, functional class, functional state of the cardiovascular system.

During many years, the rheumatic diseases were frequent extra genital pathology in pregnant women [5]. But in recent decades, due to the successful prophylaxis of fever, the incidence of the current disease in pregnant women has slightly decreased [2]. Recently, it was observed that there has been an increase in the number of pregnant women and mothers suffering from heart diseases, which is explained by a number of reasons: the early diagnosis of such diseases; the opportunity to save the pregnancy in cases, which were previously impossible; the increase in the number of women under gone the heart surgery; and the number of seriously ill women, who make a decision to continue the pregnancy with the permission of doctors or on their own, being confident in the success of medical science and practice. The exacerbation of rheumatoid process has also an adverse effect on fetal development, it increases the risk of developing of complications from the mother's side during the pregnancy, the childbirth and the postpartum period. This is explained by the fact, that pregnancy increases the load on the cardiovascular system (CVS), even in healthy women; while at a risk of hemodynamic changes due to existing defects, the load increase many times [3; 4]. An increase in the frequency of premature births, incidence of pathological blood loss during delivery and perinatal

mortality is observed depending on the severity of heart failure (HF) [6]. In this regard, it is important to consider the assessment of physical performance as an indicator of myocardial reserve capacity. According to ESC, it is recommended to use the exercise testing for the objective evaluation of the functional activity of the pregnant woman [1]. But in the available literature, we have not found an answer to: what kind of exercise testing exactly is advisable to apply for pregnant women? So, the assessment of physical performance and capacity, in our view, is preferably to carry out with the most physiological method, namely, a six-minute walking test in order to evaluate the risk of cardiovascular complications.

#### Objective

To estimate the parameters of central hemodynamics in relation to exercise tolerance in women with rheumatic heart disease.

#### Methods and materials of investigation

The study involved 70 pregnant women at the age of 19–35 years, with rheumatic heart disease in the 2<sup>nd</sup> and 3<sup>rd</sup> trimester of gestation. Along with the considering and evaluating the complaints and anamnestic data, a physical examination was also fulfilled during pregnancy. The evaluation of the functional state of the cardiovascular system was carried out comprehensively, taking into account electrocardiographic

and hemodynamic parameters. The ECG was conducted in 12 standard leads. The assessment of hemodynamic parameters included: the analysis of heart rate frequencies (HRF); blood pressure (BP) level, measured by the standard method of Korotkov. For the purpose of studying the intra cardiachemodynamics, the echocardiography method was used on "SONOLINE VERZA PRO" device ("SIEMENS", Germany), in accordance with the recommendations of the American Association of Echocardiography in M and B modes. Laboratory blood tests included complete blood count (CBC), and the identification of rheumo test (RT). The exercise tolerance test in the form of a 6-minute walk was applied to all surveyed patients. The test was conducted in the hospital corridor with a length of 40 meters. Before fulfilling the test, the initial state of women: BP control, heart rate and electrocardiogram was evaluated. Then pregnant women were offered to walk for 6 minutes in individually adjusted maximum rate, which does not cause the further discomfort or manifestations of HF symptoms (breathlessness, weakness, tiredness or heaviness in the legs). In case of appearance of HF symptoms during the performance of physical activity, the women had to slow down or stop walking until their state stabilized, and then continue walking. Thus, the duration of test remained the same, and the rest time was included into 6-minutes period. The 6-minute test result allow us to determine the functional class of HF. For this purpose we used the HF classification, proposed by New York Heart Association (NYHA) in 1964. Depending on the passed distance, all surveyed pregnant women were divided into 3 groups: Group 1 (n=12) — women with functional class (FC) I of HF, Group 2 (n=24) — pregnant with FC II of HF, and Group 3 (n=34) — pregnant with FC III of HF. The research results were subjected to statistical processing based on BIOSTAT program for Windows (version 4.03). The sample average (X) and the sample standard deviation (SD) were determined. The reliability of inter group differences was assessed by Student's T-test. For all types of analysis,  $p < 0.05$  value was considered statistically significant.

#### The research results

The average age of the patients, gestation period, the parity number in groups did not differ. The systolic blood pressure BP (SBP) level and diastolic BP (DBP) in groups were also comparable. In pregnant women in FC III of HF the HRF (heart rate frequency) was higher in comparison to the pregnant in FC I of HF, respectively  $102.63 \pm 10.94$  beats/min, vs.  $94.25 \pm 10.87$  beats/min ( $p = 0.028$ ) in group 1;  $98.79 \pm 14.59$  beats/min in group 2.

According to ECG data, higher parameters of HRF (heart rate frequency) were marked in Group 3, compared to Group 1, amounting

to  $93.86 \pm 14.6$  beats/min in Group 3, and  $85.73 \pm 9.48$  beats/min in Group 1 ( $p = 0.02$ ). In Group 2 the HRF (heart rate frequency) did not differ significantly from Groups 1 and 3, amounting to  $90.89 \pm 11.57$  beats/min. Lower atrial rhythm was observed in 2 pregnant women (5.9%) in Group 3. The blockade of the right bundle branch block was observed in 4 pregnant women (11.8%) and 1 pregnant (2.9%) of Group 3. In 16 pregnant women (47%) of Group 3 there was revealed cardiac arrhythmias in the form of ventricular premature beats (PVCs), whereas it was observed only in 1 pregnant (8.3%) in Groups 1 and 2 ( $\chi^2 = 4.168$ ,  $p = 0.041$ ). Supraventricular arrhythmias (SVES) was detected in 3 surveyed patients of Group 3, and 2 pregnant in Group 1. In the 3<sup>rd</sup> group it was observed the slowing of the pulses on the cardiac conduction system, extending the PQ, QRS, QT intervals.

According to the echocardiography data; in Group I, the 1<sup>st</sup> type mitral regurgitation (MR) is detected in 4 pregnant women (33.3%), 2<sup>nd</sup> type in 8 pregnant women (66.7%). The 1<sup>st</sup> degree of tricuspid regurgitation (TR) was revealed in 1 patient (8.3%), and 2<sup>nd</sup> degree TR in 1 pregnant (8.3%) also. In group 2: 1<sup>st</sup> type MP was detected in 11 (52.3%), and 2<sup>nd</sup> type MP — in 7 (29.2%) pregnant women. 1<sup>st</sup> type aortic regurgitation (AR) was detected in 3 (12.5%), and 2<sup>nd</sup> type AP in 4 (16.7%) pregnant women. The 1<sup>st</sup> type TP was detected in 6 (25%), and 2<sup>nd</sup> type TP in 1 (4.2%) pregnant. In 2 (8.3%) patients it was revealed stenosis of the mitral orifice and in 1 (4.2%) patient stenosis of the aortic orifice of moderate severity. In Group 3: 1<sup>st</sup> type MP was detected in 14 (41.1%), 2<sup>nd</sup> type MP — in 13 (38.2%), and 3<sup>rd</sup> type MP in 2 pregnant women. 1<sup>st</sup> type AP was detected in 5, 2<sup>nd</sup> type AP in 3, and 3<sup>rd</sup> type AP in 1 (2.9%) pregnant. The 1<sup>st</sup> degree TP was seen in 6 (17.6%), 2<sup>nd</sup> degree TP in 2 (5.9%) pregnant women. In 2 (5.9%) of pregnant women it was diagnosed mitral stenosis holes and in 1 (2.9%) patient stenosis of the aortic orifice of moderate severity. In other words, the increase in the depth and severity of valve apparatus lesions is associated with an increase in FC of HF. The study of central hemodynamic parameters showed that in pregnant women with FC III of HF, despite the persistence of average standard indicators of the group, there is a significant trend towards an increase in heart size (mostly left chambers), the frequency of occurrence of separation sheets of pericardium, as a marker of pericardial effusion, as well as decrease in the contractility of the left ventricle myocardium (Table 1). What is more, the differences in myocardial contractility is fairly significant between all analyzed groups.

Table 1. – Indicators of echocardiography in pregnant women with rheumatic heart diseases depending on FC of HF

Parametres	Group 1 (n = 12)	P1	Group 2 (n = 24)	P2	Group 3 (n = 34)
LA (mm.)	$30.42 \pm 3.9$	> 0.05	$33.96 \pm 6.02$	0.016	$34.05 \pm 4.43$
LVEDD (mm.)	$50.42 \pm 2.15$	> 0.05	$50.39 \pm 4.74$	0.035	$53.33 \pm 4.37$
LVESD (mm.)	$30.83 \pm 1.95$	> 0.05	$31 \pm 3.53$	0.028	$33.57 \pm 3.98$
IVS (mm.)	$8.08 \pm 0.97$	> 0.05	$8.1 \pm 0.65$	> 0.05	$8.17 \pm 0.71$
PW (mm.)	$7.35 \pm 0.89$	> 0.05	$7.37 \pm 0.62$	> 0.05	$7.42 \pm 0.65$
RV (mm.)	$20.86 \pm 3.0$	> 0.05	$21.3 \pm 3.95$	> 0.05	$22.45 \pm 3.64$
LV mass (g.)	$129.83 \pm 23.9$	> 0.05	$132.06 \pm 28.79$	> 0.05	$144.45 \pm 27.74$
EDV (ml.)	$115.7 \pm 17.11$	> 0.05	$122.5 \pm 25.6$	0.015	$137.58 \pm 27.98$
ESV (ml.)	$35.2 \pm 5.91$	> 0.05	$43.1 \pm 19.98$	0.002	$47.69 \pm 12.94$
EF (%)	$68.3 \pm 4.04$	0.000	$61.3 \pm 5.16$	0.000	$60.7 \pm 5.6$
E/A	$1.57 \pm 0.36$	> 0.05	$1.99 \pm 2.63$	> 0.05	$1.44 \pm 0.37$
The fluid in the pericardial cavity (amount)	1 (8.3%)	> 0.05	5 (20.8%)	0.044	12 (35.3%)

Note: P1 — the reliability of differences between groups 1 and 2; P2 — reliability of differences between groups 1 and 3.

Table 2. – Indicators of exercise testing in pregnant women with rheumatic heart diseases according to FC of CH

Parameters	Group 1 (n = 12)	P1	Group 2 (n = 24)	P2	Group 3 (n = 34)
Passed distance in meters	474.17 ± 25.33	0.000	371.04 ± 30.24	0.000	261.03 ± 52.73
SBP before (mm Hg)	102.08 ± 11.17	> 0.05	100.42 ± 8.59	> 0.05	100.71 ± 7.87
SBP after (mm Hg)	123.75 ± 11.5	0.000	109.79 ± 8.29	0.000	108.86 ± 11.51
DBP before (mm Hg)	65 ± 6.74	> 0.05	64.37 ± 6.96	> 0.05	62 ± 6.66
SBP after (mm Hg)	70.83 ± 9.0	> 0.05	70.83 ± 8.29	> 0.05	69.71 ± 8.31
HRF before (beats/min)	92.4 ± 7.98	> 0.05	99.04 ± 15.47	0.025	102.2 ± 13.8
HRF after (beats/min)	122.5 ± 9.2	> 0.05	129.79 ± 13.3	0.021	132.4 ± 13.2
Breathlessness	7 (58.3%)	> 0.05	18 (75%)	$\chi^2 = 6.2$ ; p = 0.01	32 (94.1%)
Heartbeats	5 (41.7%)	> 0.05	11 (45.8%)	$\chi^2 = 5.3$ ; p = 0.02	28 (82.3%)
Tiredness	4 (33.3%)	> 0.05	10 (41.7%)	$\chi^2 = 5.6$ ; p = 0.02	26 (76.5%)

Note: P1 — the reliability of differences between groups 1 and 2; P2 — reliability of differences between groups 1 and 3.

During the test with a 6-minute walk, the distance covered was significantly greater in Group 1 compared to Groups 2 and 3. Thus, in Group 2 and 3 of there was a less marked increase in SBP levels, in response to physical strain compared with Group 1, in spite of the initial lack of these differences. Before the physical activity, the HRF was higher in Group 3 compared to Groups 1 and 2. The increase of HRF related to physical activity prevailed in Group 3. In this case, it is typical that a subjective exercise tolerance in Group 1 was better than in Group 3 of pregnant women (see table 2).

The analysis of hemogram indicated the prevalence of inflammatory blood indices in Group 3 compared to Group 1, so, the level of leucocytes in Group 3 was  $9.2 \pm 2.22 \cdot 10^9/L$ ,  $7.34 \pm 1.87 \cdot 10^9/L$  (p = 0.013) in Group 1, and  $9.4 \pm 3.84 \cdot 10^9/L$  in Group 2. Erythrocyte sedimentation rate (ESR) was also higher in Group 3:  $4.28 \pm 0.23$  mm/h,  $22.5 \pm 7.37$  mm/h in Group 1 (P = 0.034) and  $24.33 \pm 10.28$  mm/h in Group 2. Blood hemoglobin level in all groups was comparable. According to the results of rheumatoid factor (RF) and ASO was revealed in a group of pregnant women with FC III of HF, compared with the group of pregnant women with FC I of HF. Thus, the CRP in

Group 3 was  $12.64 \pm 16.64$  mg/L, in Group 1 —  $6.04 \pm 2.58$  mg/L (p = 0.008), and in Group 2 —  $9.53 \pm 7.22$  mg/liter. ASO in Group 1 was  $251.6 \pm 139.53$  IU/ml, in Group 3 —  $347.2 \pm 134.28$  IU/ml (p = 0.041), and in Group 2 —  $268.48 \pm 118.5$  IU/ml. The level of rheumatoid factor (RF) in subgroups did not differ: in Group 1 —  $10 \pm 0.94$  IU/ml, in Group 2 —  $10.2 \pm 0.77$  IU/ml, and in Group 3 —  $10.88 \pm 2.36$  IU/ml.

The obtained data indicate that in pregnant women with rheumatic heart diseases the signs of heart failure, defined by exercise tolerance with a standard six-minute test, develop on the background of minimal changes of linear and volumetric parameters of the myocardium, which does not exceed the normal limits. However, in this case, a significant difference is observed between these parameters in groups of women with FCI and FC III. Reduction of myocardial contractility has reliably significant character as the increasing of physical activity of HF. Along with this, the hemodynamic parameters and their correlation with the PAT (physical activity tolerance) testify that the signs of inflammation, with comparable values of hemoglobin, have a significant impact on increase in HF.

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## Changes of the brain microcirculatory bed in different types of the blood loss and hemorrhagic shock

**Abstract:** The aim of the research was to determine thanatogenetic significance of blood filling degree of MCB vessels in the brain sections in different types of blood loss and in hemorrhagic shock. By means of by-stage method comparing the number of blood-filled vessels of microcirculatory bed in large hemispheres and in the brain trunk their different content has been estimated in acute, massive blood loss and hemorrhagic shock.

**Keywords:** premotor cortex, brain, neuroglia, blood loss, hemorrhagic shock.

### Introduction

Irreversible changes in the brain tissues occur before complete hemostasis takes place [2]. Most of vascular reactions in the brain are realized in short intervals of time — to 1 min [5]. Up to now information concerning the condition of the brain microcirculatory bed (MCB) vessels in blood loss and hemorrhagic shock (HSh) has not been systemized yet [4; 8; 9].

**The aim of the research** — to study the condition of the brain MCB vessels in different types of blood loss and HSh.

### Material and methods of the research

The brain of 48 corpses underwent forensic medical expert examination for death caused by different types of blood loss and HSh as a result of cut-stab and incised wounds. Complex evaluation of the research results of corpses made it possible to determine the following types of blood loss: ABL (4 cases), MBL caused by single injury and by multiple (8) injuries of the heart and magistral vessels and also MBL caused by single (7) and multiple (13) injuries of peripheral vessels. HSh due to a single injury of the heart and magistral vessels (4 cases) and peripheral vessels – single (3) and multiple (5 cases).

The material for special study was taken from the large hemispheres of the brain (field 6, according to Brodman), the walls of ventricle III with hypothalamus area and fund of ventricle IV with the area of medulla oblongata. The material was fixed in 10% of neutral formalin, poured over with paraffin and colored with hematoxylin and eosin according to Van-Gizon method, with resorcin-fuxin according to Veigert, with Schiff-reagent, by methods of Mallory, Nissle. The number of blood filled vessels of MCB on the given area of section was determined by doty method [1]. Each of the examined sections was studied on 2 topographic levels. In order to compare the number of blood filled vessels of MCB in different variants of blood loss and HSh, the method of stage comparison was used [3; 6]. The digital method underwent statistic processing.

### The results of the research and their discussion

The results of study concerning the number of blood filled vessels of MCB in the brain sections showed that in MBL their number in the cortex of large hemispheres is less numerous than in the white substance ( $P < 0.05$ ). In MBL different blood filling of MCB vessels is observed in the cortex of large hemispheres depending on damage to the heart and magistral vessels or peripheral vessels. With this damage to the heart and magistral vessels is accompanied by sharper anemia of the cortex and white substance than in damage to peripheral vessels. Multiple injuries in both subgroups are accompanied by more marked anemia of white substance. In HSh the number of filled MCB vessels is larger than in fast death ( $P < 0.05$ ).

In hypothalamus study it was determined that in MBL superficial layer (level 1) contains less number of blood filled MCB vessels in comparison with its deeper layer (level 2). In damage to the heart and magistral vessels in MBL the number of blood filled MCB vessels does not significantly differ than MBL. In damage to peripheral vessels marked filling of these vessels both in single and multiple injuries is observed in both levels of ventricle III walls ( $P < 0.05$ ). In HSh improvement of blood circulation in hypothalamus is not significant. On the contrary the number of blood filled MCB vessels is even less than in blood loss. Probably in damage to peripheral vessels compensatory reaction is observed not because of the vascular system of the body which produces centralized blood circulation but due to redistribution of blood inside the brain for more complete blood supply of hypothalamus. The decrease of blood supply in this brain area in hemorrhagic shock

proves insufficient degree of such compensation for normalization of blood circulation in hypothalamus in spite of providing transfusion therapy.

In study of medulla oblongata in MBL more marked anemia of its superficial layer in comparison with a deep one is determined ( $P < 0.05$ ). In MBL there are more blood filled MCB vessels than in hypothalamus in the same trauma condition as a result of single and multiple impairments of the heart and magistral vessels ( $P < 0.05$ ). It can be associated with higher adaptive abilities of the brain vascular system and its regulation of CNS vital part. In fatal injuries of peripheral vessels the number of both single and multiple blood filled MCB vessels is somewhat fewer in medulla oblongata as a whole than in hypothalamus. Besides, their number does not make significant difference from the subgroup with impairments of the heart and magistral vessels. These data confirm supposition that in the condition of fatal blood loss improvement of blood supply in medulla oblongata occurs due to redistribution of blood in the brain but not because of systemic circulation centralization. Comparison of the number of blood filled MCB vessels by stages made it possible to determine anemia presence in the structures of different brain sections in ABL, MBL and HSh in thanatogenesis. In ABL the most severe anemia is observed in superficial layer of medulla oblongata and it is also marked in its deep layer ( $P < 0.05$ ). Weak blood filling is also determined in hypothalamus and white substance of the brain hemispheres. In MBL caused by a single impairment of the heart and magistral vessels the least number of blood filled vessels is determined in the cortex, subjacent white substance of hemispheres and in hypothalamus ( $P < 0.05$ ). Blood supply of medulla oblongata is impaired in a less degree. The same participation in thanatogenesis of the studied brain sections is observed in multiple injuries with impairment of the heart and magistral vessels. In this type of trauma anemia of the brain hemispheres white substance is sharply marked. In MBL caused by impairment of peripheral vessels the same thanatogenesis is observed both in single and multiple injuries. It is first of associated with severe anemia of the brain hemispheres white substance. In multiple injuries clearly marked anemia of medulla oblongata superficial layer is added to it. In HSh caused by injuries of peripheral vessels the most number of blood filled MCB vessels is observed in the cortex of the brain hemispheres and white substance located under it. The least number of blood filled MCB vessels is determined in hypothalamus. In a single injury blood supply of medulla oblongata also decreases in comparison with similar trauma and MBL but in multiple injuries blood supply of medulla oblongata improves.

Thus, in ABL the mechanism of centralization of blood circulation probably does not have time to begin operating and redistribution of blood in cerebral vessels between the brain sections is not considerable. In MBL with damage to the heart and magistral vessels in medulla oblongata the improvement of blood supply takes place due to the blood redistribution [7]. In MBL with impairment of peripheral vessels due to slower death outcome the mechanism of blood supply centralization probably begin to operate and it results in improvement of the cortex blood supply but anemia of blood substance persists. Blood supply in the hypothalamus also improves but it persists at the same level in medulla oblongata. In HSh caused by injury of the heart and magistral vessels transfusion therapy is not properly effective due to marked anemia of the brain sections. In peripheral vessels injuries and HSh blood supply of the cortex and white substance improves in transfusion therapy and blood supply of medulla oblongata becomes better. However with this marked anemia is observed in hypothalamus.

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## Increase in psychosocial status of school age children with dentomaxillary deformities

**Abstract:** Most people have problems with their appearance, are ashamed of their external view and that has negative effect on their life. To avoid such cases it should be begin from childhood. As a rule, correction of these states is a mission of orthodontist and intervention of children's psychologist. Fifty children with occlusion deformities have been examined.

**Keywords:** psychosocial status, orthodontics, dentomaxillary deformities, orthodontic treatment, smile.

### Introduction

Face of person has the greatest effect from viewpoint of attractiveness. Smile is the second feature of face after eyes to which people pay their attention while estimating attractiveness of humans. It is exactly that beautiful look and smile became an important part of a successful person because we express our emotions and attract persons to us. Influence of self-appraisal on personality is very great. In his (her) low self-appraisal person has not faith in herself, possibilities, and he (she) does not like himself. They experience self-dissatisfaction stable or very often. Person works, achieves aims, defines new goals, but his negative relation to himself remains. Besides, human' low self-appraisal, without fail, reflects on his appearance. One of the psychosocial tasks of person is to have present look that requires present society [1; 3].

Attractiveness plays an enormous importance both in professional and social society. How it was noted in the University of the North Caroline the patients often appeal Orthodontist: 84 % cases for uneven teeth, 52 % cases according to Dentist advice and 41 % cases for unpleasant look. Nice look indicates that person presents a good, honest and happy man. It is exactly that unpleasant look of person sets thinking receive orthodontic treatment that leads him to success in social life. After orthodontic treatment and perfection of esthetic appearance children become less shy and emotionally more sure and feel themselves more attractive among their friends and social surroundings [2; 7; 9].

Most children have crowded teeth and occlusion deformities and require orthodontic aid. From year to year rate of bite deformities pathology is stably increasing. It is related with food consumed



by contemporary people. Consuming soft food our masticatory apparatus, as a rule, does not obtain loading planned by nature. As a result maxillary bones of modern humans are developing not enough and teeth preserve a former size and they feel tight. There are congenital causes: for instance, person has a small number of teeth, than it is appropriate, these teeth «scatter» in maxilla (mandible) and wide unattractive gaps are forming between them.

Uneven teeth and bite deformity may be cause of psychological problems of communication, harmful act on human destiny. But even to overcome psychological complex of crowded teeth, problems provoked by them are not solved by themselves. Occlusion diseases aggravate a course of gingival diseases, provoke development caries due to impossibility of adequate hygiene, lead to rapid dental abrasion, complicate, and sometimes, make impossible dental prosthetics. But the most dangerous — may lead to development of functional disorders of temporomandibular joint — the most complex joint in human organism [3; 4, 454; 6, 9].

**Goal of research**

Evaluate and improve psychosocial status of children with dentofacial deformities before and after orthodontic treatment.

**Materials and methods of research**

Fifty patients with dentofacial deformities (congestion of teeth, Class II and Class III malocclusion and open bite) aged from 7 to 16 in numerical equal of boys and girls in clinic № 56 at the Tashkent Pediatric Medical Institute. Questioning was performed and method “Ladder” (auth. V.G. Schur) was used before and after orthodontic treatment. Results of questioning of patients before and after orthodontic treatment were compared; children that not required orthodontic treatment were also questioned. Questioning consisted in self-appraisal of child and communication (how feel they in circle of their persons of the same age, in the school and measures). Three groups were formed. The 1<sup>st</sup> group formed children that not required orthodontic treatment, the 2<sup>nd</sup> group formed children that needed orthodontic treatment and the 3<sup>rd</sup> group formed patients after orthodontic treatment.

Questions that were chosen for all the children in research were the following:

1. I am rather attractive.
2. I am talented.

3. I often envy other that they have.
4. I very worried about what people around me think about me.
5. For me it is difficult to accept compliments from other people.
6. I depend on opinion of other people.

Table 1.

Sex	Congestion of teeth	Prognathism	Progenia	Open bite	Number of patients
Boys	11	9	2	3	25
Girls	8	10	3	4	25
In all	19	19	5	7	50

**Results and their discussion**

Questioning of children not needed orthodontic treatment revealed the following results: they were quite self-assured, emotionally steady, they consider themselves very talented and attractive and they are not afraid of show their I. Second group (children before orthodontic treatment) exhibited the following results: they are irresolute, very emotional and sometimes anxious, diffident because of their external view and very depended on other children, they are not consider themselves talented and often envy other persons of the same age. Results of the third group of patients were approximately like children in the first group, because during orthodontic treatment these children received positive effect from the side of parents, Orthodontist and Psychologist. Tasks of the latter three influenced on psychosocial status of children, indicating that they turned out grate in treatment, with other school-children and they became more attractive and successful.

**Conclusions:**

1. How it was noted, children with dentomaxillary deformities really suffer from psychosocial problems.
2. Improvement of external view helps orthodontic patients to perfect their style of life including their psychosocial status.
3. Research shows that positive mood from a side of Orthodontist on children and teenagers from the outset, in the middle and at the end of orthodontic treatment improved self-appraisal and psychosocial status.

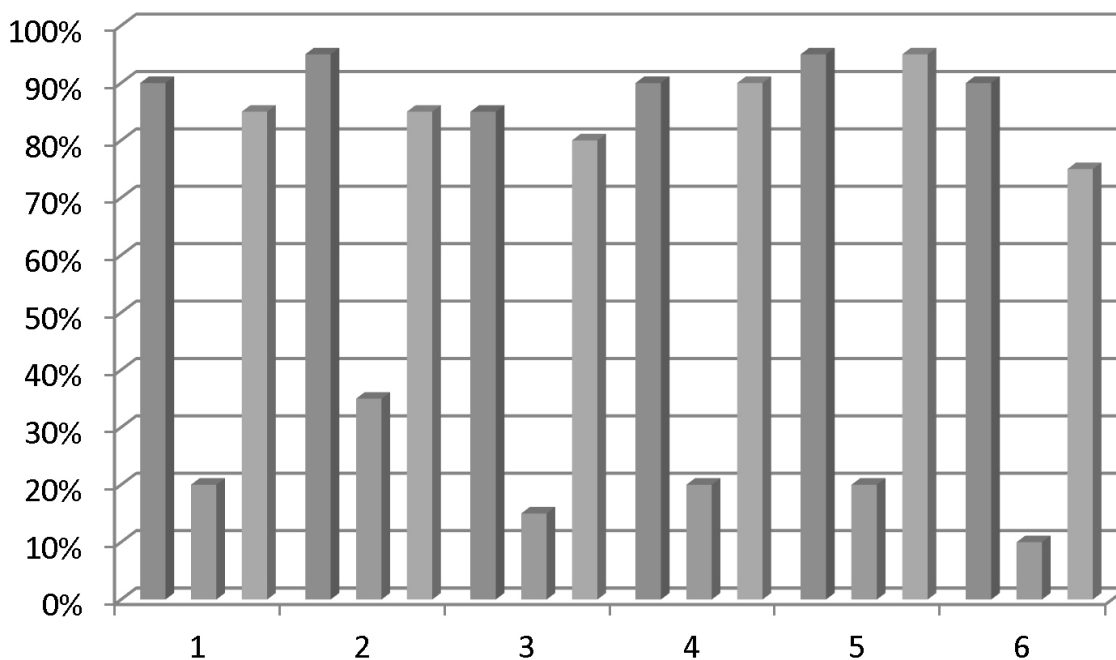


Fig. 1. Results of questioning of three groups of patients in percentage in 6 questions

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## Parkinson's disease: prevalence of the disorder in the view of medical statistics

**Abstract:** Parkinsonism — a neurological syndrome characterized by a combination of akinesia, rigidity, resting tremors, and postural instability, it is a progressive degenerative disease of the central nervous system. Quoted in reports alarming figures make you think that in the last two decades, the incidence of parkinsonism increased. In all countries of the world has been an increase of vascular brain lesions caused by hypertension and atherosclerosis. Changes in the blood vessels of the brain are one of the main causes of Parkinson's disease development. Parkinsonism is usually sad “privilege” elderly. Most often the first symptoms appear between 50–60 years

**Keywords:** Parkinson's disease, epidemiology, statistics.

Parkinsonism is a neurologic syndrome, which can be characterized as the combination of akinesia, rigidity, resting tremor and postural instability; it is considered to be an advanced degenerative disease of central system. Taking statistical data into account, we can conclude that the disease incidence has grown for the last two centuries. In all countries throughout the world, the prevalence of vascular disorders of brain cord, caused by hypertony and atherosclerosis, is observed. Alterations of brain cord are one of the main reasons of Parkinson's disease. It is commonly spread among aged people. In most cases, the first signs of the disease appear at the age of 50–60 years old. According to the epidemiological research, Parkinson's disease is observed in all ethnical groups, with equal frequency among males and females. WHO states, that more than 4 million people all over the world suffer from Parkinsonism [19]. In addition, the number of people at the age of 30–40 years old, who suffer from the disease, is constantly growing. The growth of the disease frequency is stipulated by life expectancy, but some other factors (e.g. ecological) can also play role. There are about 100 thousand patients, suffering from the disease, in Russia. Low rate of the disease incidence and mortality is noted. There are some difficulties with the diagnosis of disease, especially with early stage, as it can be diagnosed primarily with reference to clinical disease and the course of the disease.

**The objective of the research** is to define the disease incidence in the world.

### Results, methods and debates

Parkinsonism is one of widely spread neurodegenerative disease in the world, which can be compared in this respect only with Alzheimer's disease. Parkinsonism comes with deterioration in condition of corticobasal systems of activation and suppression, which turn to be contravolitional characteristics of the disease. Parkinson's disease is caused by the developing break-down of structure and function of dopaminergic neurons in ventraltegmental area and substantia nigra pars compacta in brain cord with the following alteration of basal ganglia of telencephalon. The data of the research, being collected, prove the hypothesis, that Parkinsonism is the result of a complex interaction of genetic deficits, toxins of the environment and mitochondrial dysfunctions. The mechanisms of neuronal degeneration, typical for Parkinsonism, have been studied; these include interaction of some pathogenic processes, including oxidative stress, protein aggregation, excitotoxic and axonal transport. In critical incidents of the disease, a growing number of genes and proteins destruct complex net of molecular pathways, engaged in its etiology. The common mechanisms account for two main forms of Parkinson's disease: familial and sporadic. Sporadic one is mostly spread (90–95 % of cases), while 5–10 % is accounted for familial form.

Epidemiological data differs greatly from one country to another. The range of the disease frequency per 100 000 of population is the following (the data from background papers):

Ethiopia — 7, Libya — 31, Poland — 66, Norway — 102, Sweden — 115, Taiwan — 130, England — 139, Finland — 166, Italy — 168, Spain — 170, Germany — 183, Russia — 238, Israel — 240, Canada — 244, Singapore — 300, Japan — 306, France — 320, India — 328, USA — 329, Brazil — 330, Korea — 370, Australia — 414, China — 522, Argentina — 657 [1, 21]. The difference can be explained by some reasons, where the influence of ecological and genetic factors, different methodological approaches, research design and age grouping of the population can be mentioned. Disease frequency can differ within the borders of one country and depends on the place where the research is carried out and the type of the research. Following low-calorie diet significantly decreases the exposure to the disease. The low percentage of the disease prevalence in Libya and other countries of Africa serves as the proof of the fact. But the dependence of the disease prevalence and the age is evident, i. e. the increased index is observed in certain age groups of population; in this case, the increase of the disease incidence index in the countries of Europe, Eastern Asia, North and South America can serve as an example.

For instance, the research, carried out in Spain (Bergareche A., 2004), demonstrate the increasing of the index with age: by 0.3 % in the age group of 65–74 years old, by 2.5 % and 2 % in the age groups of 75–84 and above 85 years old correspondingly. The lower index in the age group of the patients above 85 years old, can be explained by the decrease of the group size [11]. The research, carried out in other regions of the world, show the same tendencies as in European countries. The research, carried out in Yonago, a city in Japan, (Yamawaki M., 2009) in 2004 was based on the information about the total number of visits to the health institutions registered; it showed, that the index of disease prevalence was higher in the age group of the patients of 75–79 years old (1 256.9 cases per 105 people) in comparison with the age group of 70–74 years old (562.3 cases per 105 people), while it decreased in the age group of the patients above 90 years old (871.5 cases per 105 people) [22]. According to the research, carried out in Sydney, Australia, within the period from 1997 to 1999 (Mehta P., 2007) the index of Parkinsonism prevalence reached its maximum in the group of the patients aged 70–79 years (820 cases per 105 people) and it decreased in the group of the patients above 80 years old (560 per 105 people) [17].

Different tendencies can be distinguished in the research of the disease prevalence with gender factor taken into account. The burden of Parkinsonism differs among males and females. The majority of the research state an earlier start of the disease among men. In Spanish province Navarre the average age of the disease is 67.5 years among males and 72.6 years among females [17]. In Japan the average age of the disease is 68.08 years among men and 69.08 years among females [18]. The least average age is observed in Sweden, but still the earlier start of the disease is noted among men, with the average age 65.2 years old, while it is 66,1 years among women [12]. In the research, carried out in Estonia, the average age of the disease is 68.8 years old, but no difference was found with reference to gender factor from the time the first symptoms of the disease appeared [16]. According to Haaxma C. A. (2007), the results of the epidemiological research on a lower rate and an older age of the disease among females can be explained by physiologically higher level of dopamine in striatum and estrogen activity [14].

In Russia the only significant research of Parkinson's disease was carried out in the USSR during 1969–1971 in 6 cities, belonging to different geographical zones [6]. The data were collected on the base of all visits to the health institutions and sampled medical

examinations. The disease prevalence was 63.9 cases per 105 people and 184.6 cases per 105 people in the age group of the patients above 40 years old. The results of the research of the disease prevalence in different regions of Russia during the last 10 years are presented in Table 1. The majority of the research were carried out on the ground of visits to the health institutions and only one full-design study of the whole population was conducted in Solnechnogorsky region of Moscow territory [4]. The index of the disease prevalence varies in different regions. The maximum was observed in Tomsk (238 cases per 105 people), the minimum was manifested in Moscow in 1975 (27 cases per 105 people) [2; 6]. The index significantly varies in the latest research, from 55.15 cases per 105 people in Irkutsk territory up to 198 cases 105 people in Smolensk [7; 9]. The analysis with the respect to the disease prevalence in accordance with age and gender factors also give ambiguous data. In Solnechnogorsky region of Moscow territory Parkinsonism among men at the age of 65 went beyond the same among women more than twice, along with the situation in Krasnoyarsky region (54.5 % among men, 45.5 % among women) [3; 5]. At the same time, in Smolensk the predominance of the disease prevalence among women of employable age was noted, the index was the same among the patients of both genders in the group of the patients above 60 years old, while there was the predominance of male patients in the age group of patients above 80 years old [9]. In the research, carried out in Russia, the index of the disease prevalence depends not only on territories, but also on the time of the research. Thus, in Krasnodar the index increased 1.3 times (from 89.6 to 114.4 cases per 105 people) within the period 1975–2007. The disease prevalence possesses a great range of indexes [8]. The minimal index is observed in Karelia (188 cases per 105 people), while maximal one in Solnechnogorsky region of Moscow territory (16.3 cases per 105 people a year within the period from 2001 to 2003) [6, 10]. The wave curve of the index in Chukotka Autonomous Region with the absence of prior disease registered is worth mentioning. In North Ossetia-Alania the increase of the sick rate and decrease of prior disease was registered in 2010–2011. The same tendency is noted in Tatarstan in 2009–2010, in Altai Territory in 2010–2011 and some other constituents of the Russian federation. There were registered neither prior disease nor fatal case as the result of Parkinsonism in Chukotka Autonomous Region, though there were the patients, suffering from the disease, under the medical observation [19; 22]. The fact is considered to be connected with the efficient neurologist service density in the region (1.96 per 10 000 people). According to the Medical research and information center, 1275 patients, suffering from Parkinsonism, were registered in Stavropolsky krai in 2015, 735 of them were under the medical observation. In 2013 — 1256 patients, suffering from Parkinsonism, were registered, with 726 of them under the medical observation; in 2014 the total number of registered patients was 1236, with 756 of them under the medical observation. The results of the research of Parkinson's disease in Stavropolsky krai is presented in Table 2. Variability of the indexes of the disease prevalence is stipulated by different methodology of the research and non-compliance with the standards of epidemiological research (it makes the further comparison region-wise study difficult), rather than territorial difference. In some cases non-sufficient population base or the lack of the results standardization is observed; that results in jumping to conclusions, wrong compilation of the results per total population.

### Conclusion

The research showed that Parkinson's disease is one of the widely spread neurodegenerative disease all around the world in whole and in Russia in particular.

Table 1. – The results of Parkinson's disease prevalence in Russia

The territory under research	Parkinson's disease prevalence	Disease prevalence per 100 000 people	Disease prevalence per 100 000 people a year
Smolensk	21	198	Males — 1.4; Females — 3.5
Solnechnogorsky region of Moscow territory	12	139.9	16.3
Krasnoyarsk	653	62.72	n/a
Petrozavodsk	537	n/a	1.88
Tomsk	n/a	238	n/a
Bashkortostan	1622	68.6	3
Voronezh	155	75	n/a
Krasnodar	n/a	114.4	8.6
Irkutsk territory	n/a	55.15	n/a
Ivanovo	n/a	102.8	n/a
Mogilev	108.7	108.7	n/a
North Ossetia-Alania	n/a	173.3	20.6
Samarskaya territory	n/a	125	8.2
Tatarstan	n/a	120.4	8.2
Altai Territory	n/a	122.2	13.5
Yamalo-Nenets Autonomous Okrug	n/a	40.7	4.9
Magadan territory	n/a	38.4	4.8
Тыва	n/a	16.9	3
Chukotka Autonomous Region	n/a	7.8	0

Table 2. – The results of Parkinson's disease prevalence in Stavropolsky kraj

Year	The total number of the patients, suffering from Parkinson's disease	The total number of the patients under the medical observation
2013	1256	726
2014	1236	756
2015	1275	735

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## Inheritance in patients with multiple sclerosis

**Abstract:** The problem of heredity of multiple sclerosis (MS) is an important practical issue, as the etiology and pathogenesis of this disease isn't well understood. The urgency of this problem stems from the fact that the number of multiple sclerosis patients is increasing every year, with the proportion of women among the infected is 52 %, while the share of men is 48 % [1; 2].

**Keywords:** multiple sclerosis, inheritance.

The incidence of multiple sclerosis most highly prevalent among the white population of the globe, especially in areas inhabited by immigrants from Northern and Central Europe as well as Scandinavia. The number of patients among the small ethnic groups of the population, are still not considered to be involved in the disease. Among the Slavic population in the republics of the Caucasus and Central Asia, the prevalence of MS was much less than in the European part of Russia [6].

### Objective

To analyze the genetic predisposition to multiple sclerosis.

### Results

Multiple sclerosis — a chronic, progressive disease that affects the brain and spinal cord, that result in violations of muscle control, blurred vision, disturbance of body balance, sensory disturbances [8].

Multiple Sclerosis is not a hereditary disease, but observations indicate the presence of certain hereditary (genetic) predisposition [1; 2; 3]. These assumptions are based on the results of epidemiological studies that multiple sclerosis affects mainly people with white skin, as evidenced not only data on the prevalence of the disease in terms of its geographical distribution, but also the difference in the incidence rate between the white and black population countries in the Americas and South Africa [1].

It is assumed that a predisposition to the disease multiple sclerosis is caused by the presence of several genes (polygenic inheritance). It is also possible genetic polymorphism [4]. This is indicated by twin data and genealogical research, as well as non-linear reduction in the risk of the disease among relatives of the patient

with a decrease in the degree of kinship. For siblings of the patient the probability of the disease in their lifetime is 2–5 %, while it is slightly lower [5] for parents and children.

Genetic susceptibility to multiple sclerosis, presumably associated with a given individual a combination of several genes that determine disorders, especially in immunoregulation system.

The data obtained from the analysis of different populations suggests that patients with multiple sclerosis significantly increased frequency of antigen HLA-A3, HLA-B7, HLA-DR2, HLA-DR3, HLA-DQ6 and other [1; 3]. In multiple sclerosis, also noted the association of the disease with certain haplotypes of HLA, including specific combinations of loci allelic MHC.

In multiple sclerosis, there is damage to the nervous system's own immune system cells. These cells enter the brain, destroy the myelin sheath of nerve fibers and lead to scarring. This nervous tissue are replaced by connective [8].

Multiple sclerosis is the most difficult demyelinating disease of the Central nervous system with predominant autoimmune mechanism of development, remitting disseminated over, affecting people of young age and inevitably resulting in disability. Over the last three decades of domestic and foreign scientists (Schmidt E., Khondkarian A. O., Leonovich A. L., Gusev E. I., Boiko A. N., Zavalishin I. A., Demina T. L., Jerusalem A. P., Pohorski A. M., Shevchenko P. P., Stolyarov I. D., Poser C. M., McDpnald W. I., Ebers G. C., Lauer K., Sadovnick A. D. and others) enormous work has been done on the standardization and systematization of methods of epidemiological analysis in multiple sclerosis, which contributed to the accumulation of the volume of objective

information, which allows to judge the more authentic distribution of multiple sclerosis in the world [6].

The pathogenesis of multiple sclerosis consists of a complex immunopathological and pathochemical reactions developing in the nervous system. It is believed that immune processes are induced antigenic structures of the CNS and especially — the main protein of the myelin glycoprotein and myelin — oligodendrocyte macromolecules. Energichnyh activation of T-lymphocytes in the periphery (outside the CNS) is the first stage of the immunopathogenesis of multiple sclerosis. Note that autoreactive clones of T-lymphocytes that react with self antigens of the CNS, are present in healthy people, but in minimum quantities and in an inactive state.

Immunological changes in multiple sclerosis are manifested by abnormalities of cellular and humoral immunity. Of cellular reactivity are determined by: the decrease in the content of T-suppressor cells, suppression of T-cell response to mitogens, low potential of NK-cells and altered production of interferon, the increased cytotoxicity of mononuclear cells, changes in the system of interleukins.

The activity of immunopathological reactions is determined by the level of antigen-presentation in the tissue and activity of cell adhesion to the vascular endothelium, activation of T-cells, which in response to some antigens may have a polyclonal nature. The balance of suppressor and activation of cytokines, their soluble receptors and inhibitors is crucial in the progression of immunopathological process in the CNS.

Emerging in scattered sklerose in white matter of brain and spinal cord the pathological lesions are called plaques. The leading feature of these lesions is demyelination. Activation of resident cells of the CNS — microglia and astroglia — stimulates the secretion of their cytokines and chemokines (factors that attract cells to the area of inflammation). In the pockets of migrating cells of hematogenous origin monocytes/macrophages, T- and b-lymphocytes. So begins the formation of plaque. In inflammation cells secrete a variety of active molecules: cytokines, antibodies, oxygen and nitrogen radicals, proteases. These molecules are the main factors of damage to oligodendrocytes and myelin. The ongoing destruction of myelin leads to the appearance in it proteoliticheski active fragments, which contributes to its further damage. The fibers in the inflammation demyelinated fibers and disturbed the nerve impulse, which leads to the appearance of

clinical symptoms. Simultaneously with the process is demyelination and remyelination, which is especially noticeable at the edges of active plaques. However, despite the emergence of the process of remyelination at the early stages of plaque formation, restoration of the myelin sheath occurs efficiently enough. The longer the disease, the less pronounced the process of remyelination, which may be associated with a significant decrease in the number of oligodendrocytes.

Prolonged and severe demyelination occurs the death of the axons, leading to the emergence of persistent symptoms. During the damage of oligodendrocytes and myelin releasing large amounts of autoantigens, giving impetus to further development of the autoimmune process. Regulatory mechanisms that ensure the normal balance of Pro — and anti-inflammatory cytokines and timely suppression of the immune response, are in multiple sclerosis insolvent, which is responsible for the progression of the pathological process.

The evolution of the plaques characteristic of cyclicality. Re-aggravation is manifested by inflammation at the periphery of the zone of gliosis, the lesion increases in size. Along with this there are new seats, and some can regress. The lesions range from several millimeters to several centimeters. They are formed around blood vessels (venules). Usually the lesions are located periventrikuljarnoj — front and rear horns of the lateral ventricles, supraventrikuliarna, the corpus callosum. Often they are localized in the brain stem and cerebellum, the cervical-thoracic spinal cord, roots of the cranial nerves, can be located also in the entrance area of roots in the spinal cord. In the case of a far advanced process of the lesions can spread to the gray matter of the brain. In addition to focal changes, multiple sclerosis inherent and diffuse signs of inflammation in the membranes, atrophy and gliosis of the white matter.

#### Conclusion

Thus, we can speak of the existence of a genetic predisposition to multiple sclerosis. It is determined by the combined effect of a number of related genes of the immune response, leading of which are major histocompatibility complex genes. It is assumed that the inheritance of specific alleles of these genes, in collaboration with a number of natural and environmental factors can generate an increased or decreased susceptibility to the effects of the immune system specific etiological factor, “trigger” pathogenetic cascade of multiple sclerosis, for example — a hypothetical viral agent.

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## Complex aspects of diagnosis and treatment associated trauma in the acute phase

**Abstract:** These studies are based on an analysis of 315 patients after a comprehensive examination and treatment in the wards Neurotraumatology and neyroreanimations Andijan branch of the Republican scientific center for emergency medical services. The patients' age from 16 to 76 years in the groups studied male majority. Catamnesis patients from 2010 to 2016 In our center set up special reception department for patients with combined injuries. This complex includes a one-time skilled care of a neurosurgeon, trauma, ophthalmologist, lorvracha, neurologist, gynecologist, surgeon, urologist, followed by clinical and paraclinical methods of investigation. This factor is allowed to carry out timely complete clinical diagnosis and emergency care in targeted combined injuries

**Keywords:** Combined injury, traumatic brain injury, diagnosis, treatment and injuries of the musculoskeletal system.

### Introduction

The problem of treatment of combined injuries in the last quarter of the twentieth century has occupied a leading position, due to its great social significance. Combined injuries are one of the three major causes of death, and the population under the age of 40 years, the reason comes out on top.

Combined injuries are the most severe type of injury, characterized by high and has no tendency to excess of 10 times that of isolated lesions with reduction in mortality component of 23.3–85 %, long-term disability and a high level of disability (25–80 %) [1; 2; 3]. According to many authors, the poor results of treatment of patients related to the lack of a unified doctrine of surgical relief of severe concomitant injury, with treatment most of the victims in general surgical hospitals and surgeons with insufficient representation about the features of surgical tactics in combined injuries [2; 4; 5; 6].

### Material and methods

Our research is based on an analysis of 315 patients who had a complete examination and treatment in offices and neurotraumatology neuroreanimation Andijan branch RSCEMH (Andijan Regional Emergency Medical Hospital). The patients' age from 16 to 76 years, studied a group of men made up the majority (132). Catamnesis patients from 2010 to 2016 years.

In our RSCEMH created special reception office for patients with combined injuries. This complex includes a one-time assistance to qualified neurosurgeon, traumatologist, ophthalmologist,

ENT doctor, neurologist, gynecologist, surgeon, urologist, followed by clinical and paraclinical methods. This factor has allowed to carry out timely complete clinical diagnosis and emergency care in targeted associated trauma.

Depending on the severity of injuries of traumatic brain injury (TBI), spinal column, spinal cord (SM) and the musculoskeletal system (ODA), we used the classification of Hanover combined injury and classification of combined traumatic brain injury neurosurgery institute them. Acad. N. N. Burdenko, Academy of Medical Sciences. On this basis, we have developed and proposed a classification of associated injuries.

Combined injury — ST:

- ST Grade I — non-severe TBI and extracranial not heavy damage;
- ST Grade II — non-severe head trauma and severe extracranial lesions.
- ST Grade III — severe TBI and extracranial not heavy damage.
- ST IV degree — severe head trauma and severe extracranial lesions.

For serious injury ODA and CM attributed fractures of the hip, pelvis, tibia, shoulder, multiple bone fractures of extremities, stable and unstable fractures and dislocations of the vertebrae, damaged SM without him, its roots. For a mild injury and ODA CM assigned closed fractures of facial bones, hand, foot, forearm, the fibula, the nose, the unilateral fractures of the ribs have 1–3 without pleural damage, injuries of the trunk and limbs.

### Results

To perform complex neurotraumatologicheskogo examination and treatment, if needed emergency surgery on the brain and spinal cord of patients with I–II Group, III Group and partly to immobilize fractures impose a plaster splint, external fixation devices. This made it possible in the future to turn patients, puncture, which contributed to the prevention of pneumonia, bedsores, etc. Treatment of patients with serious violations of the functions of vital organs caused by head injury, was carried out in 3 stages.

The first was carried out resuscitation and antishock measures.

The second provided emergency assistance, depending on the severity of the brain damage (dents removal of bone fragments, intracranial hematomas, crushing parts of the brain, etc.) or limbs (debridement, fracture reduction and fixation of plaster bandage, skeletal traction and external fixation devices).

The third step is performed sequentially systematic treatment of patients. When lighter damage the brain, spinal cord and limbs were treated in two steps of — for lack of need for resuscitation and antishock measures.

When combined injuries occur more significant than in isolated brain injury changes the liquor, which is correlated with the degree of severity of the condition, which may provide some prognostic sign. Often this is manifested in the form of xanthosis or hemorrhage (82 cases).

Among the observed patients about traumatic brain injury were operated 30.7%, limb fractures — 29.3%, spinal injuries and spinal cord — 11.6%.

Our experience convinces us that there is no single, universal operation. Everything is determined by the specific situation. When the prevailing traumatic brain injury, unless contraindicated by the general condition of the patient is the most reasonable conduct osteoplastic trepanation.

Resection trepanation method is applicable in cases of violations of vital (51 operated). Extension Method Milling holes hematoma removal is justified only in the elderly. When you remove intracerebral hematoma, especially localized in the motor area of the brain, sometimes there is a need in the introduction of supply and ottochnoy systems and solutions aimed at thinning the blood clots.

To prevent the increasing edema of the brain during surgery further punctured the lateral ventricles and established special outdoor adjustable drainage for 3–5 days.

Thus, diagnosis and treatment of associated injuries are certain difficulties. Caused by a trauma, and extracranial injuries. Analysis of the results allowed the following conclusions.

### Conclusion

Timely, qualified to the extent necessary to provide medical assistance at the scene, combined with the correct and rapid transportation of victims to specialized medical institution contributes to a reduction in mortality and reduction of disability and reduces the rehabilitation period in patients with combined injuries.

Traumatic shock with concomitant serious injury observed more than half of the victims. Shock may occur against the background of impaired consciousness. Respiratory failure, disorders of the central regulation of cardiovascular activity as cerebral and spinal level that causes the severity, atypical and duration of treatment, tolerance to activities conducted antishocked treat.

Puncture and drainage of the cerebral ventricles with rising swelling warn brain compression and development of dislocation syndrome with combined injuries.

Timely comprehensive drug treatment reduces the length of stay in hospital, and the use of regional lymphotropic therapy allows to obtain economic effect because it reduces hospital stay and rehabilitation period is reduced.

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## Diagnostic value of identification of IgG subclasses in the blood serum of patients with acne

**Abstract:** Acne vulgaris is chronic, often with recurrences disease characterized by impairment of the functional activity of the immuno-hormonal system of the body that causes heavy clinical progressing of disease. At the ground of the dyshormonal state of the body the humoral immunity has become of great importance. The immunoglobulins are the effectors of humoral immunity. The majority of immunoglobulins connected with the surface of B-lymphocytes carry out function of the antigen-recognizing receptor. Among all classes of immunoglobulins 80 % present immunoglobulins of G class. The scientific information on a spectrum of antibodies of this class in the patients with acne is extremely scant and contradictory. Taking into account insufficiently knowledge of this issue and suggesting that singular isotypes of immunoglobulins of IgG class can be one of criteria of assessment of the severity of disease as well as curability of the inflammatory process and prognosis of its possible acceleration we put the task to study the spectrum of immunoglobulins IgG in the patients with acne disease with regards to the stage of severity of disease.

**Keywords:** acne, diagnostic, IgG subclasses, clinic, bacterial sensibilization.

Acne is chronic, often with recurrences disease characterized by impairment of the functional activity of the immuno-hormonal system of the body that causes heavy clinical progressing of disease [1; 2; 5; 7]. At the ground of the dyshormonal state of the body the humoral immunity has become of great importance. The immunoglobulins are the effectors of humoral immunity. The majority of immunoglobulins connected with the surface of B-lymphocytes carry out function of the antigen-recognizing receptor. Among all classes of immunoglobulins 80 % present immunoglobulins of G class [4; 6; 8].

The scientific information on a spectrum of antibodies of this class in the patients with acne is extremely scant and contradictory. Taking into account insufficiently knowledge of this issue and suggesting that singular isotypes of immunoglobulins of IgG class can be one of criteria of assessment of the severity of disease as well as curability of the inflammatory process and prognosis of its possible acceleration we put the task to study the spectrum of immunoglobulins IgG in the patients with acne disease with regards to the stage of severity of disease.

### Material and methods

This study included 34 patients with acne (A) of the age from 17 to 27 years. At all patients there were carried out clinical, microbiological and immunological investigations. The clinical examinations were characterized by determination of the severity degree with use of classification offered by Plewig G. and Kligman A. M. (1994). Definition of the quantitative contents of specific immunoglobulins of IgG class to antigen of *Candida albicans*, common immunoglobulins IgE, common immunoglobulins IgG1, IgG2, IgG3, IgG4 in the blood serum was performed with use of immune-enzymatic test-systems "Vector-Best" (Novosibirsk).

Statistical processing of the received results was made with use of the program Statistika V.55A using the criterion of Shapiro-Wilk.

### Results

According to classifications offered by Plewig G. and Kligman A. M. (1994) among 34 patients suffering from acne there have been identified the following forms: comedones (comedos-ouacnecomedonica) in 4 (11.7%) patients, papulopustular form (acnepapulosae papulopustulosa) — in 21 (61.7%), phlegmanous form (acnephlegmonosa) — in 7 (20.6%), and fulminant acne (acnefulminans) — in 2 (5.8%), respectively.

Using classification developed by the American Academy of Dermatologists there was diagnosed light stage of disease in 11 patients among 34 patients that accounted for 32.4%, moderate degree — in 10 (29.4%), and severe degree — in 13 (38.2%) patients.

The results of IEA assay of IgG levels in the blood serum in the patients with A showed statistically reliable increased concentration of all parameters of subclasses in comparison with parameters of control group ( $P < 0.05$ ) (Table 1). In our point of view such sharp increase of immunoglobulins IgG concentration promoted the body tension to infiltrative-inflammatory process.

According to the data of table 1, the level of IgG1 increased 2.3 times than the parameters of the healthy persons and achieved  $5.6 \pm 0.1$  mg/ml ( $P < 0.05$ ). Such picture was observed in parameters of IgG2 (2.4 times), IgG3 (1.8 times) and IgG4 (225 times), respectively. The high level of subclasses IgG indicated about significant body response to toxic effect of opportunistic microorganisms at the ground of "antigen mimicry" and immunosuppressive state of the patient organism.

Table 1. – The level of immunoglobulins of IgG subclasses in healthy persons ( $M \pm m$ ) mg/ml

Subclasses	IgG1	IgG2	IgG3	IgG4
Healthy persons, N=15	$2.4 \pm 0.3$	$1.4 \pm 0.3$	$0.6 \pm 0.1$	$0.004 \pm 0.002$
Patients with acne, N=34	$5.6 \pm 0.1^*$	$2.9 \pm 0.07^*$	$1.07 \pm 0.04^*$	$0.9 \pm 0.04^*$

Note: \* — index of reliability in relation to parameters of control healthy group ( $P < 0.05$ ).

Microbiological investigations of the skin in the focuses of the lesions in the patients with acne showed that in 93.2% of cases there was isolated *Staphylococcus* spp., and in relation to strains in 48.8% of cases the growth of pathogenic strain *St. aureus* was noted. Mycological cultures examination of the body biosubstrates (oral cavity mucosa, bowel) showed high prevalence of yeast fungi *Candida*, accounted for 65.9% (in 29 of 44 patients). Thus among body biosubstrates the greatest quantity of culture isolations were noted in the bowel, that was 52.3% (23 patients). The data obtained indicated about mixed-bacterial contamination of the biosubstrates (skin, mucous environments) in the patients with acne which promotes aggravation of clinical course of disease and development of immunopathological syndromes, such as endotoxic shock and reaction of Shvartsman without appreciable participation of T-cells [3; 8].

The increased level of the contents of subclasses IgG in the blood serum may be as diagnostic and prognostic criterion of the clinical course of disease (table 2).

It is visible from table 2 that in the patients with acne of severe degree characterized by formation more than 25 papular and pustular elements on the skin of the trunk, dense nodular elements of infiltrate character the level of IgG1 increased 2.2 times in comparison with parameters of control healthy group ( $P < 0.05$ ). Whereas in the patients of mild degree the level characterized by presence of comedones and nodules of inflammatory nature in quantity less than 10 IgG1 increased 2.5 times. This tendency was noted in the indicators of subclasses IgG2 — 2.2 times, IgG3 — 2 times and IgG4 — 225 times, respectively ( $P < 0.05$ ). It should be noted that in the patients with acne with moderate

degree all subclasses were consequently increased in reliable parameters ( $P < 0.05$ ) (tab. 2). Thus, in the patients with acne of mild degree the contamination of the bowel by *Candida* sort accounted for  $14746.8 \pm 958.9$  KOE/g, that was 29.4 times higher in comparison with parameters of the healthy persons ( $P < 0.05$ ). Whereas in the patients with moderate and severe stage of disease the contamination of the bowel increased in 71.9 times and 81.04 times, respectively. The study of the IgG level to *Candida* in the patients with acne revealed its increased contents in the blood serum in statistical reliable parameters in comparison with control group of the healthy persons ( $P < 0.05$ ) (table 2).

The data obtained testify to the increased sensitivity of the body to fungi of *Candida* sort. The high level of a subclass IgG4 indicated about development of bacterial sensibilization that is connected with a high level of the common immunoglobulin E ( $P < 0.05$ ).

Thus, the study of the spectrum of immunoglobulins of Class IgG in the patients with acne of mild degree reflects the high bacterial loading in the body that can serve as the indicator of disease progressing. So, at increase of concentration IgG1 in 2.5 times and IgG2 in 1.8 times in the patients with acne it is possible to predict heavy development of disease, that requires timely tactics of the complex antibacterial therapy.

#### Conclusions

Thus, the identification of subclasses of immunoglobulins of IgG class has the important role during clinical monitoring of the patients with acne with mucogen sensibilisation of disease in order to increase the efficiency of the complex therapy performed and to prevent the complicated forms of the acne process.

Table 2. – Characteristic of the immunoglobulins of IgG subclasses in the blood serum in the patients with acne in relation to the severity degree of disease, ( $M \pm m$ ) mg/ml

Subclasses	IgG1	IgG2	IgG3	IgG4	IgE	IgG Candida	Quality
Healthy persons, N = 15	$2.4 \pm 0.3$	$1.4 \pm 0.3$	$0.6 \pm 0.1$	$0.004 \pm 0.002$	$27.5 \pm 6.8$	$0.2 \pm 0.03$	$502 \pm 39.1$
Mild stage of disease, N = 11	$6.03 \pm 0.1^*$	$3.1 \pm 0.08^*$	$1.2 \pm 0.07^*$	$0.9 \pm 0.05^*$	$147.3 \pm 9.7^*$	$0.4 \pm 0.04^*$	$14746.8 \pm 3958.9^*$
Moderate stage of disease, N = 10	$5.6 \pm 0.3^*$	$3.08 \pm 0.1^*$	$0.9 \pm 0.07^*$	$0.7 \pm 0.08^*$	$164.4 \pm 12.2^*$	$0.5 \pm 0.08^*$	$36110 \pm 8253.3^*$
Severe stage of disease, N = 13	$5.2 \pm 0.3^*$	$2.6 \pm 0.1^*$	$1.09 \pm 0.06^*$	$1.02 \pm 0.03^*$	$142.6 \pm 6.4^*$	$0.3 \pm 0.07^*$	$40684.2 \pm 4465.3^*$

Note: \* — index of reliability in relation to parameters of control healthy group ( $P < 0.05$ ).

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## Prevention of postoperative thrombotic complications at women with uterine myoma with low molecular weight heparin in complex system enzyme therapy

**Abstract:** This study aimed to study of evaluate an administering of low-molecular weight heparin (LMWH) in complex with system enzyme therapy (Wobenzym) efficiency on prevention of postoperative thrombotic complications at 60 women with uterine myoma concerning to the high risk. All operated women were concerned to the high risk degree of development a postoperative thromboembolic complications (POTC). And they have been administered LMWH Clelexan in a daily dosage of 0.4 ml. once a day subcutaneously up till 10 days after operation. Primary early thromboprophylaxis and its postoperative continuously specific prevention was spent with a preparation — Wobenzym in a daily dosage for 3–5 tabs a 3 times a day up till 4 weeks.

**Keywords:** uterine myoma, a haemostasis, deep veins thrombosis, low-molecular weight heparin.

### Introduction

The problem a prevention of thromboembolic complications for operative gynecology is rather actual. Frequency of deep veins thrombosis after various gynecologic operations varies within 11–37%, and pulmonary thromboembolism (PTE) developed due to deep veins thrombosis (DVT) is one of the reasons of postoperative lethal outcomes in 18–22% cases [3]. Venous thromboembolism (VTE) is an important and potentially preventable complication of major gynecologic surgery, and the common frequency postoperative thromboembolic complications with rates of DVT, PTE, and fatal PTE (19–20%) are comparable to those seen after general surgical procedures [3; 4].

Despite the quality which has increased during last two decades period of the operative gynecologic care, deep veins thrombosis of lower limbs and generated by it PTE take a leading place among postoperative complications in gynecologic patients and it's still recognized as a important problem of operative gynecology.

All gynecologic patients who are especially undergoing to the operative treatment, to some extent, are thrombotic dangerous, as in majority of them there are can be observed a hypercoagulation alterations in haemostasis system and venous circulation failure in the lower limbs and a pelvic can be observed (L. A. Ozolini, 1999, Russia)

### Purpose

To evaluate of administering of low-molecular weight heparin (LMWH) in complex with system enzyme therapy efficiency on prevention of postoperative thrombotic complications at women with uterine myoma concerning to the high risk.

### Materials and methods

Our study has been carried out in department of operative gynecology, consultative polyclinic and haemostasiology laboratory of Republican specialized scientific-practice medical center of obstetrician and gynecology, Tashkent.

Criteria of inclusion of patients to the study: patients with uterine myoma which recommended operative treatment, and those patients, which distances the written informed consent.

Criteria of exclusion of patients: patients with a uterine myoma which administered a conservative treatment with blood diseases, blood diseases characterizing with the hypocoagulation; intolerance to preparation components of Wobenzym or Clelexan; patients who have not given the consent to participation in study. Further, in purpose of an estimation of efficiency of an offered thromboprophylaxis technique all patients from prospective study have received

medicamentous thromboprophylaxis by a technique offered by us: LMWH (Clelexan) + SET (Wobenzym).

For comparison of LMWH efficiency there were conducted a retrospective studying of 158 case histories of patients (II group) at the similar age with investigated group, which undergone to the abdominal hysterectomy due to uterine myoma at Department of operative gynecology of RSSPMC of O&G of Uzbekistan during the period from 2005 up to 2008 years.

All patients from the retrospective analysis on purpose preventing of postoperative thrombotic complications had been administered unfractionated heparin (UFH) subcutaneously in dosage on 5000 IE 3 times a day. The results of analyzing a reproductive function, the structure of accompanied extragenital and gynecological diseases, clinical-anamnesis dates in both investigated group were almost similar. For the comparison of haemostasiological results there was studied haemostasis system of 20 rather somatically healthy women (control group) at the reproductive age without any accompanied gynecologic diseases.

The estimation of haemostasis state was conducted in dynamics prior to and on 1<sup>st</sup>, 3<sup>rd</sup>, 7<sup>th</sup> days on the postoperative period at haemostasiological laboratory of RSSPMC O&G. And there were used a reactants of firm Barnaul (Russia) which included in itself definition of: activated partial thromplastine time (APTT), prothrombin time (PT), prothrombin ratio (PR), the International normalized ratio (INR), amount of soluble fibrin — monomer complexes (SFMC), and fibrinogen, platelets count (PLC).

### Results

Due to all patients from prospective study aged above 40 years and concerned to the high risk (aa of them undergone to the total hysterectomy) they are included to the high risk. By our developed technique, medicamentous thromboprophylaxis (MTP) was spent on 2 stage:

- 1<sup>st</sup> stage of MTP was spent in out-patient conditions in case a revealing of pre thrombotic conditions at laboratory research. The purpose of the given stage was to define degrees of risk of development of postoperative thrombotic complications (POTC), hence preparation of patients for the operative performance, carrying out an early preventive maintenance of intra — and early POTC in accordance of risk degree. Risk degrees of POTC was defined by using of the special criteria, developed by French anaesthesiologists Samama M, Samama N, and modified by us. Preoperative thromboprophylaxis with LMWH Clelexan was spent in those patients who had deeply

changes in coagulation system characterized with pre thrombotic condition which established laboratorically (table 3). Daily dosage and duration of administering of medicaments was determined taking into account of risk degree. In other cases patients as a primary prevention were administered SET — Wobenzym in a daily dosage for 3–5 tablets a 3 times a day before meal till up 2 weeks.

- 2<sup>nd</sup> stage thromboprophylaxis was spent in the conditions of hospital for the purpose of prevention of development of early and late POTC by following scheme:

**A. Nonspecific thromboprophylaxis:** elastic bandaging prior to operative performance which continued until discharging from hospital; early activation after surgery, adequate hydration.

**B. Specific thromboprophylaxis:**

- Clexan (LMWH, enoxaparin) 0.4 ml. 1 time injection in the field of umbilicus till up 10 days;
- in a high risk degree III C daily dosage of Clexan was increased till up 0.6 ml.

**C. Medicamentous thromboprophylaxis with Wobenzym:**

(In existing of thrombotic anamnesis or thrombophilia, daily dosage of Wobenzym is consisted a 5 tabl 3 times a day on 1<sup>st</sup> weak, gradually increasing in 1 tabl a weak: on the 2<sup>nd</sup> weak on 4 tabl a 3 times a day, on the 3<sup>rd</sup> weak on 3 tabl 3 times a day) administering Wobenzym was began just after stopping to injection a latest dosage of Clexan.

Nonspecific not medicamentous preventive maintenance was spent in all patients. Postoperative medicamentose thromboprophylaxis was spent with Clexan, and its Efficiency and duration of postoperative application were defined on haemostasiologically and by objective, subjective criteria of the patients, which developed by us.

The proximate results have been estimated on the early postoperative period by laboratory parametres and by postoperative condition of the patient (objective and subjective dates).

The distant results estimated in 6 months after operation by questioning by use of the special questionnaire (the General questionnaire of health (MOS SF – 36)) estimations of quality of the life of postoperative patients.

All patients have been undergone to the total hysterectomy. The average size of both uterus and fibroid were 12 weeks (min. 8 week; max. 24 week). At 7 (37%) of surveyed women there is revealed a fast-growing uterine myoma. Prominent features of reproductive function of women of the given contingent of patients has shown, that 7 (35%) among of them were multiparas, and 11 (55%) were multigravidas, hence, recurrent artificial abortions are revealed at 6 (30%), spontaneous abortions at 7 (35%) women. In the structure of extragenital diseases there are most often observed pathologies had appeared cardiovascular disease in 12 (60%), obesity in 4 (20%), anemia in 6 (30%), varicose veins of the lower limbs at in (15%), a gastrointestinal tract disease in 3 (15%) patients with uterine myoma.

In majority patients there are most often revealed some concurrent diseases such as obesity, hypertension, anemia and varicose veins of lower limbs. Most often occurring accompanied gynecologic pathologies at investigated patients with uterine myoma were ovarian cysts and cystomas, cervical erosion, endocervicitis, endoservicosis, ovuli naboti which because of all patients were exposed to the operative intervention in volume of extirpation of uterus with its appendages and without of them.

All patients admitted to the department of operative gynecology of RSPMC of O&G with the diagnosis of symptomatic uterine myoma for the operative treatment, further confirmed histologically. All patients were exposed to the abdominal hysterectomy

by indications, as a preference method of anesthesia in majority cases we have administered of spinal anesthesia (SA). Duration of operation performance in investigated group averaged about 65 minutes, average volume of interoperation hemorrhage was 200 ml.; and at II<sup>nd</sup> group (comparison group) these rates were 95 minutes and 350 ml. accordingly.

To all investigated patients were carried out nonspecific preventive maintenance, including to Pharmacological prophylaxis was conducted with LMWH Clexan (Enoxaparin, Sanofi Aventis, France) taking in account of risk factors degrees, thus because all patients from both investigated groups were aged above 40 years, and all of them were exposed to hysterectomy with appendages or without of them, we have included all women to high degrees of risk of development a postoperative thromboembolic complications. In this connection, they have been administered LMWH Clexan in a daily dosage of 0.4 ml. once a day subcutaneously in the field of abdomen till 10 days. On administration of spinal anesthesia preoperative dose of Clexan injected 12 hours and on administrating general anesthesia and 2 hours prior to operation. The subsequent doses began at once after 8 hours of the surgical intervention. In addition of to pharmacological prevention we have prescribed as a system enzyme therapy — Wobenzim (Mucous farm, Germany), which contains in its composition an enzyme bromelain, in a daily dosage by 3 dragee three times a day a 30 minutes before meal till four weeks.

Results of the analysis a coagulogram which had being carried in dynamics at II<sup>nd</sup> group of patients were distinctly differed from I<sup>st</sup>, and comparison results with I and control groups were statistically significant ( $p < 0.05$ ). At patients, which pharmacologic method of thromboprophylaxis were carried out with UFH on the 3<sup>rd</sup> and 7<sup>th</sup> days at the postoperative period a fibrinogen concentration had statistically significant increased, results of SFMC analysis was characterized by progressing reliable increase its amount of the last on 1<sup>st</sup>, 3<sup>rd</sup>, 7<sup>th</sup> days (Table 3). In contrast, comparing to I<sup>nd</sup> I group, at patients from I<sup>st</sup> group against the carried complex preventive maintenances with administration LMWH depending on degree of thrombotic complications development risk on the 3<sup>rd</sup>, 7<sup>th</sup> days on the postoperative period there are any significant hypercoagulation alterations changes have not revealed (Table 2).

As a shown the dates from Table 3 the analysis of conducted haemostasiological studying results was at women from II<sup>nd</sup> group receiving thromboprophylaxis with UFH characterized with increasing of the concentration of SFMC in comparison with control group and with its initial level which was revealed before operation. At these patients on admission to the hospital initial average level of SFMC (N up to 3.5 mg%) was  $4.0 \pm 1.0$  mg%, in comparison with control group ( $2.8 \pm 1.3$  mg%) was to 42.8% more (on the reliability  $p < 0.05$ ); on the 1<sup>st</sup>, 3<sup>rd</sup>, 7<sup>th</sup> days of postoperative period there was detected increase of its quantity ( $5.3 \pm 1.3$  mg. of%,  $6.3 \pm 1.6$  mg%,  $7.3 \pm 0.8$  mg% accordingly), the highest average curve occurred on 7-day ( $7.5 \pm 0.6$  mg%) and in comparison with its initial level was authentically increased to 82.5% ( $p < 0.05$ ), and against the control group it was on 2.7 times more. Fibrinogen concentration has begun to increase about on 3<sup>rd</sup> day ( $3.7 \pm 0.7$  g/l) and the highest average curve were observed on 7<sup>th</sup> day ( $4.3 \pm 0.7$  g/l) after hysterectomy. As increase SFMC at these patients confirmed about thrombinemia, joining increased amount of fibrinogen (N 2–4 g/l) in the 7-day confirms intensifying coagulation of investigated patients in the postoperative period (Table 3).

The analysis of results APTT which conducted in dynamics has demonstrated, that as distinctly from patients administered LMWH,

in patients from II<sup>nd</sup> group on 7<sup>th</sup> day was detected shortening of its meaning (on the average  $33.8 \pm 6.3$  sec.) which testified to alteration of blood coagulation towards hypercoagulation. Despite on conducting thromboprophylaxis with UFH on the 7<sup>th</sup> day of postoperative period there were observed an activation of initial mechanisms of the internal cascade of haemostasis in these patients.

The analysis of dynamics of laboratory parameters on the 7<sup>th</sup> day of postoperative period at patients of II<sup>nd</sup> group concerning to the high risk has shown, at these patients in comparison with patients concerning to the high risk of thromboembolic complications development under exposing abdominal hysterectomy against carrying out thromboprophylaxis with UFH haemostasiological pattern characterized of prethrombotic state which demands carrying out an optimal complex thromboprophylaxis. This is accompanied with synchronic increasing of SFMC and fibrinogen concentration with simultaneously shortening a time of APTT.

On the contrary, at carrying out thromboprophylaxis with LMWH there was demonstrated another haemostasiological pattern at control laboratory analysis which conducted in dynamics (Table 2). In comparison from patients of the retrospective analysis (II group), increasing amount of SFMC was insignificant, and it's the highest average curve in patients of I group was detected on 3-day ( $3.4 \pm 2.9$  mg %) in the postoperative period, in comparison with initial level was reduced on 10.5 % (prior to operation  $3.8 \pm 0.6$  mg %). Significant increase of SFMC in the postoperative period during the studying of haemostasiogram analyses in patients from retrospective studying have detected especially in those patients who had accompanying extragenital pathologies, such as arterial hypertension, obesity, moderate anemia, varicose veins disease. Have especially been expressed at what had some accompanying pathologies.

Table 2. – Haemostasis state indices in women with uterine myoma before and after hysterectomy received LMWH Clezan (I group n=60)

Parameters	Prior to	1 <sup>st</sup> day	3 <sup>rd</sup> day	7 <sup>th</sup> day
Fibrinogen, g/l	$2.5 \pm 0.5$	$2.6 \pm 0.6$	$2.7 \pm 0.6$	$2.8 \pm 0.7$
APTT, sec.	$35.3 \pm 2.1$	$36.5 \pm 2.4$	$37.5 \pm 2.8$	$37.2 \pm 3.1$
PT, sec.	$15.4 \pm 0.9$	$16.2 \pm 0.8$	$16.8 \pm 1.4$	$16.6 \pm 1.4$
PR, IU	$1.03 \pm 0.07$	$1.07 \pm 0.06$	$1.05 \pm 0.05$	$1.05 \pm 0.05$
INR	$1.0 \pm 0.1$	$1.1 \pm 0.2$	$1.1 \pm 0.2$	$1.1 \pm 0.2$
SFMC, mg %	$3.8 \pm 0.6$	$2.6 \pm 2.1$	$3.4 \pm 2.9$	$3.3 \pm 2.8$
T, 10 <sup>9</sup> /l	$218.2 \pm 33.6$	$217.2 \pm 32.7$	$227.2 \pm 33.8$	$220 \pm 30.5$

Table 3. – Haemostasis state indices in women with uterine myoma before and after hysterectomy received UFH (II group n=158)

Parameters	Prior to	1 <sup>st</sup> day	3 <sup>rd</sup> day	7 <sup>th</sup> day
Fibrinogen, g/l	$2.8 \pm 0.6$	$3.0 \pm 0.6$	$3.7 \pm 0.7$	<b><math>4.3 \pm 0.7^*</math></b>
APTT, sec.	$37.7 \pm 5.2$	$37.4 \pm 5.2$	$35.3 \pm 4.4$	<b><math>31.8 \pm 6.3^*</math></b>
PT, sec.	$15.6 \pm 1.2$	$15.9 \pm 1.2$	$15.9 \pm 0.9$	$15.9 \pm 1.0$
PR, IU	$1.0 \pm 0.1$	$1.1 \pm 0.1$	$1.1 \pm 0.1$	$1.1 \pm 0.1$
INR	$1.0 \pm 0.1$	$1.1 \pm 0.1$	$1.1 \pm 0.1$	$1.1 \pm 0.1$
SFMC, mg %	$4.1 \pm 1.1$	$5.3 \pm 1.4$	$6.5 \pm 1.6$	<b><math>7.5 \pm 0.6^*</math></b>
T, 10 <sup>9</sup> /l	$210.7 \pm 44.5$	$202.3 \pm 27.4$	<b><math>229.7 \pm 76.7</math></b>	$215.0 \pm 35.4$

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Table 1. – Haemostasis state indices in women from control group (n=20)

Parameters	Meanings	Parameters	Meanings
Fibrinogen (2–4 g/l)	$2.3 \pm 0.5$	PR	$1.02 \pm 0.3$
APTT (32–42 sec.)	$37.7 \pm 3.1$	INR	1.2
PT (14–17 sec.)	$15.3 \pm 0.7$	SFMC (up to 3.5 mg %)	$2.8 \pm 1.3$

Postoperative decrease of PLC was detected in patients from II group in the 3<sup>rd</sup> day of postoperative period ( $229.0 \pm 66.7 \times 10^9/l$ ), which explaining by heparin induced thrombocytopenia causing with administering of UFH, however LMWH does not influence of amount of platelets. Other parameters were within the limits of norm at all patients from I and II investigated groups (Table 1).

#### Conclusion

1. Received dates from studying have demonstrated, that traditional preventive maintenance of thromboembolic complications with administering UFH does not allow to result coagulation potential of patients with uterine myoma concerning to the high risk of development of thromboembolic complication at carrying out of abdominal hysterectomy even in an initial level which at them was before operative treatment.

2. Receiving LMWH simultaneously with complex measures for preventive maintenance postoperative thromboembolic complications with the account of degree of risk allows to decrease a little of thrombotic complications in women with uterine leiomyoma. Thus, administrating of Wobenzim as a desaggregate therapy simultaneously with LMWH leads to the improvement of haemostasiological conditions, also, prevents and reduces not only developing of post operative thromboembolic complications, but reduces haemorrhagic complications caused by administering of antithrombotic therapy.

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## Assessment of BRCA 1,2 gene mutation as genetic risk factor for ovarian cancer

**Abstract:** The analysis was conducted pathological preparations 204 patients with verified diagnosis of ovarian cancer. Prevalence 5382insC mutation (BRCA1) 4.0 % of the sample of breast cancer patients, 11.6 % of the sample of patients with ovarian cancer, which is consistent with the data of numerous works of domestic and foreign authors, which have been shown the prevalence of mutations 5382insC gene BRCA1 in various areas of Andizhan region. Five mutations — 4153delA, 5382insC, Cys61Gly, 2080delA, 3819delGTAAA, in BRCA1-gene have been reported in patients with ovarian cancer and healthy risk 5382delA mutation.

**Keywords:** ovarian cancer, gene mutation, BRCA1,2, survival.

### Introduction

To date, we identified and characterized two genes inherited mutation which give rise to family forms ovarian cancer and breast cancer — BRCA1 and BRCA2 (from BREast CAncer — breast cancer) [4; 6; 7]. All the relatives of the family having the same abnormal gene variant increases the risk of developing cancer. This risk for life, according to some estimates, close to 90 % [1; 2]. More importantly, the risk of developing the disease at a young age in carriers of mutations in approximately 10 times exceeds overall risk in the population. Often found in the same family and cases of breast and ovarian cancer [3; 5]. Identification of mutations followed by clinical examination of patients will allow, is to prevent the development of disease in patients with mutations and their relatives [2; 4]. We should not think that all cases of cancer are due to inherited mutations, and susceptibility to disease are always inherited. About 85 % of breast cancers arise sporadically and only 15 % have a hereditary genesis [6].

### Material and methods

The analysis was conducted in the city of Tashkent Immunogen-test led by Khagai TR The material of the study was archival pathological preparations 204 patients with verified diagnosis of ovarian cancer, derived from remote during surgery patients tumor tissues. The blocks were brought to the city of Tashkent in Immunogen-test. DNA extraction was performed using a standard protocol. Using a microtome sections were prepared 20 microns thick, which deparaffinized by incubation in three changes of 500 ml. of xylene at 37 °C. Duration of incubation, each change in xylene was 20 minutes. Partial rehydration tissues was performed by incubation for 10 minutes in three changes of ethanol (96 %, 80 % and then 70 % — 500 l) at room temperature. After removal section ethanol air dried and placed in 200 ul of lysis solution (YutM Tris-HCl, pH = 8.3; 1 mM EDTA; 2 % Triton X 100, proteinase K — 500 ug/ml). Lysis was carried out at 60 °C for 12–24 hours after which samples were incubated for 10 minutes at 95 °C to complete inactivation of proteinase K. The resulting lysate was diluted tenfold with bidistilled water.

### Results

When testing for the presence of mutations in the presence of BRCA1: BRCA1\_4153delA, BRCA1\_5382insC, BRCA1\_3819delGTAAA, BRCA1\_300T>G (Cys61GLY), BRCA1\_2080delA, BRCA1\_185delA, BRCA1\_3875delA, BRCA2\_2080delA, 6174delT no statistically significant association between patients and nearest relatives, but at a total correlation of all mutations detected a statistically significant difference between groups. Mutations in a group of cancer patients was 11.1 % in the group of healthy and 2 %, which was statistically significant difference  $\chi^2 = 3.92$ ;  $p = 0.048$ . Thus, the presence of any mutations in alleles tested in any combination found in 24 of 258 (9.3 %) cases. In the group of healthy mutation found in 2 % of cases and in patients with ovarian cancer 11.1 %. This suggests that the presence of mutations at BRCA1,2 tend association with ovarian cancer may nevertheless not be sensitive diagnostic marker. There is a need to identify other factors play a role in tumorigenesis, along with the above genetic markers (tab. 1).

Prevalence 5382insC mutation (BRCA1) 4,0% of the sample of breast cancer patients, 11.6 % of the sample of patients with ovarian cancer, which is consistent with the data of numerous works of domestic and foreign authors, which have been shown the prevalence of mutations 5382insC gene BRCA1 in various areas of Andizhan region. In healthy close relatives increased risk of ovarian cancer, met at 2 %, which indicates a high risk for malignant neoplasms.

Five mutations — 4153delA, 5382insC, Cys61Gly, 2080delA, 3819delGTAAA, in BRCA1-gene have been reported in patients with ovarian cancer and healthy risk 5382delA mutation.

Also of interest is the presence of the identified mutations in different histological groups. Among patients with clear histological tumor incidence of mutations was found in 10 (20 %) in the form of papillary tumors in 2 (17.5 %) as dysgerminoma, 13.3 % to 12.5 % fetal teratoblastoma tumor, granulosa and 5, 6 % and 5 % respectively (Table 2).

Table 1. – Frequency of occurrence of mutations in the gene BRCA1,2 in groups of patients with ovarian cancer and healthy relatives

		Ovarian cancer		Healthy		
		n	(%)	n	(%)	
BRCA1_185delAG	nn	208	(100)	50	(100)	
	ndel	0		0		
BRCA1_4153delA	nn	202	(97.1)	50	(100)	
	ndel	6	(2.9)	0		
BRCA1_5382insC	nn	190	(91.3)	49	(98)	
	Nins	18	(8.7)	1	(2)	
BRCA1_3819delGTAAA	nn	205	(98.6)	50	(100)	
	ndel	3	(1.4)	0		
BRCA1_3875delGTCT	nn	208	(100)	50	(100)	
	ndel	0		0		
BRCA1_300T>G (Cys61GLY)	nn	206	(99)	50	(100)	
	ndel	2	(1)	0		
BRCA1_2080delA	nn	205	(98.6)	50	(100)	
	ndel	3	(1.4)	0		
BRCA2_6174delT	nn	208	(100)	50	(100)	
	ndel	0		0		
BRCA 1,2	No mutation	185	(88.9)	49	(98.0)	$(\chi^2=3.92)$
	Has a mutation	23	(11.1)	1	(2.0)	$p=0.048$

Table 2. – The presence of mutations in various histological groups

	No mutation			Have a mutation		
	n	Column, %	Row, %	n	Column, %	Row, %
clear cell	4	1(0.7)	(80.0)	1	(4.2)*	(20)*
Papillary	47	(20.1)	(82.5)	10	(41.7)*	(17.5)*
Dysgerminoma	13	(5.6)	(86.7)	2	(8.3)*	(13.3)*
Embrion	7	(3.0)	(87.5)	1	(4.2)*	(12.5)*
Undifferentiated	23	(9.8)	(88.5)	3	(12.5)*	(11.5)*
Serous	39	(16.7)	(90.7)	4	(16.7)*	(9.3)*
Teratoblastoma	17	(7.3)	(94.4)	1	(4.2)	(5.6)
Granulosa	19	(8.1)	(95.0)	1	(4.2)	(5.0)

In reviewing data on the survival of patients with ovarian cancer in the groups with or without BRCA1,2 analysis by Kaplan-Meieru revealed no statistically significant importance. The interval of reliability (CI 95%) in both groups vary widely, it is possible to talk about the influence of other factors (fig. 1).

#### Conclusion

The diagnostic panel including five mutations (4153delA, 5382insC, 3819delGTAAA, Cys61Gly, 2080delA in the gene BRCA1), can be recommended as a standard for primary genetic screening of patients referred for examination to the health facility to identify genetic predisposition to ovarian cancer and validate the genetic diagnosis of hereditary forms of cancer (EOC). Genetic screening can identify most cases of hereditary forms ovarian cancer patients, followed by individualization of the treatment of patients and to focus efforts on prevention and early diagnosis of disease at detection of mutations in the BRCA1 and BRCA2 genes in healthy women.

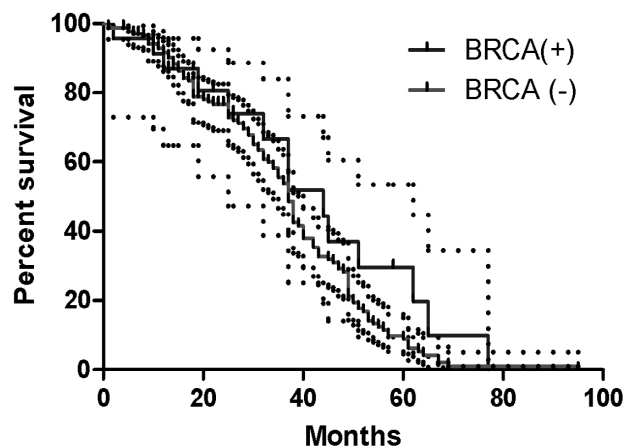


Fig. 1. Survival Kaplan Meier Group Media BRCA1,2 mutations

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## Clinical-pathogenic analysis of brain arteriovenous malformation neurologic manifestations

**Abstract:** Retrospective analysis of 109 patients with arteriovenous malformations (AVM) of brain has been carried out. Men were 67 (61.4 %) and women were 42 (38.6 %). Brain AVM are detected two times frequently in men than in women and are appeared in them at younger age. Prevalence of AVM small and big sizes with sinistrocerebral lateralization has been revealed at the analysis. The most frequent manifestation of AVM are cephalgic and epileptic syndromes.

**Keywords:** arteriovenous malformations, brain, sinistrocerebral lateralization, cephalgia, epilepsy.

### Introduction

Vascular malformations (VM) of central nervous system (CNS) are local or extensive abnormalities of vascular system. For the first time VM of CNS were described by U. Gunter in 1757 who offered «malformation» term which means «defect of development» [7]. Brain AVM is not frequently occurred nosological form but capable to provoke severe neurologic disorders and even a death. In majority of cases brain AVM are manifested by intracranial hemorrhage, epileptic attacks and hard headache. Due to up-to-date diagnostic methods of CNS AVM are often diagnosed at pre-hospital stage, surgical treatment methods of patients with CNS AVM are significantly improved, facilities of malformations intravascular occlusion have been increased and radiologic surgery has been available.

Views on brain malformations have been changed for recent decades. Viewpoint stating absolutely congenital nature of disease is subject to be reviewed. Majority of facts pointing on possibility of AVM appearance in postembryonal period and evidences of AVM features significant changes within a period of time have appeared. Increased activity of mitogen of endothelial growth factor of vessels in malformations and surrounding brain endotheliocytes has been proved and it confirms continued neoangiogenesis in malformations, partially explains their slow growth and recurrence [21]. AVM refers to the more frequent variant of vascular angiomatous defect of nervous system development and is an effect of dysontogenetic metamorphosis initiated by unknown factors. The real frequency of vascular malformations, particularly AVM, in population is unknown. It is supposed that a carrier of AVM can be up to 0.1 % of population [5]. By autopsy data, AVM are revealed in 1.4–4.3 % of autopsies [16], semeiotic ones makes 12.2 % of them [18; 22]. Clinical manifestation of AVM in population is rather stable and due to various data makes up 0.94–1.2 cases for 100 thousand of population a year [5; 6]. Characteristics of AVM by sex is unspecific: ration of men and women varies from 1.09:1 to 1.91:1, at average 1.4:1 [17].

Long-term prognosis at conservative treatment of brain AVM is unfavorable: deep invalidism becomes in 48 % of AVM carriers, and 23 % of patients die [20]. Survivability of patients with AVM makes up 85 % during first 10 years, 65 % — during 30 years from the time of diagnosis confirmation. Active treatment tactics promotes

decrease of annual mortality from 3.4 % at conservative treatment up to 1.2 % at radical intervention [14].

Mostly symptomatology of vascular malformations is observed at young and middle age — from 20 to 40 years but it can manifest itself practically at any age. If a pathology has been detected by chance at elderly age, there is a chance that it will not be manifested. In women vascular malformation's course can be worsened during pregnancy. In majority of cases AVM is manifested by hemorrhages (~50 % patients) and convulsive attacks (25 %), rarely patients complain on headache (15 %), increasing neurologic deficiency (5 %), pulsatile noise and etc. [12]. Hemorrhages origins at AVM are mostly strictly very thin, varicose vessels in the structure of malformation's glome. Due to AVM glome localization and its structure, the form of hemorrhage can be different: combined ones (31 %) and subarachnoidal (30 %) occur more frequent, rarely — parenchymatous (23 %) and ventricular (16 %) hemorrhages [13].

Key points of pathogenesis of formation primary epileptic nidus connected with brain AVM is cortical localization of AVM; blood supply with medial cerebral artery (MCA) branches, afferents from cortical arteries, varicose-draining vein, aneurisms absence in malformation glome [23]. The nature of attacks can indirectly point on AVM localization.

AVM clinical presentation, as a rule, can be manifested in two types of the disease's course: torpid and hemorrhagic ones. Torpid or pseudotumorous type of AVM course is characterized by convulsive syndrome's début, cluster headaches, semiotics of progressing neurologic deficiency. Symptomatic convulsive attacks are mostly observed (up to 67 % patients with AVM), which in 87.9 % patients remains as the first manifestation till the age of 30 years. Simple partial attacks are observed in 10 % patients, complex partial ones — in 4.3 %, partial ones with secondary generalization — in 22.4 %, generalized — in 63.3 % patients.

From other symptoms there are observed progressive neurologic disorders (19.6 %), headache (11.8 %). In 27.5 % observations torpid course is complicated by hemorrhages which stipulate the following development of convulsive syndrome in 18 % patients. Torpid course is more typical for big AVM of the 4<sup>th</sup> and the 5<sup>th</sup> category by Spetzler-Martin.



It is explained by more possible involvement of cortex as a source of convulsive activity at bigger malformations. Pulsatile glome of vascular malformation probably has stimulating effect on cortex and it together with cicatrical-atrophic changes along AVM perimeter, can explain pathogenic mechanisms of convulsive syndrome formation and progressing neurologic deficiency [1–4; 25].

Lethality from the first hemorrhage varies from 10 to 30%, invalidism reaches 50% [19]. At the same time, there are some data about more favorable functional outcomes. So, by A. Hartmann et al. (1998), 85% patients from survived ones had minimal clinical manifestations, 13% had medium invalidism, rough one — 2% patients. Patients who had parenchymatous hemorrhage (52%) were prone on invalidism [13]. More favorable prognosis of outcomes for hemorrhages from AVM unlike aneurismal or hypertensive ones is explained by relatively not high blood pressure in malformation vessels; favorable conditions for thrombosing; rare development of vascular spasm. The risk of repeated hemorrhage, especially within one year is higher and by various data, varies from 6 to 32.9% [9–11; 15] with further reducing up to primary level.

By H.J. Svien et al. (1965) data, repeated hemorrhage occurs in 34% patients survived after the first and among survived ones after the second hemorrhage 36% suffer from the third one. Hemorrhages in the following years were observed in 20% patients from the quantity of ones with unruptured AVM. Lethality at repeated hemorrhages makes up from 13 to 29% vs 10–13% at primary ones [8; 24]. Cephalgic syndrome is rare variant of disease first manifestation. By different authors data, headache is connected with enchancement of cerebral blood flow in the zone of AVM localization. The frequency and intensity of headache are varied. It

can be both constant intractable by analgesics and short-time, yielding to medicamental treatment. Regardless of debut variants, AVM must be considered as potential source of lethal or incapacitating hemorrhage. Prophylaxis of AVM complications is possible subject to the total stoppage of malformation blood supply.

### Objective

To work-out the most optimal approaches to treatment tactics choice of patients with AVM on the base of retrospective and prospective analysis results of clinical-semiologic and pathogenic features of brain AVM.

Investigation tasks: the following tasks had to be solved for achieving the objective of investigation:

1. To study the semiology of the disease and its dynamics on the base of estimation results of retrospective and prospective analysis of brain AVM clinical cases.
2. To detect the most typical clinical syndromes of AVM.
3. To determine syndromes value in treatment tactics choice of patients with AVM.

### Materials and methods

109 patients with brain AVM (67 men and 42 women) were observed in the department of neurology, neurosurgery and ICU of RRCEM in 2009–2014. The mean age of men —  $25.9 \pm 5.6$  years, women —  $30.3 \pm 9.3$  years. Diagnosis has been verified on the base of EEG, CT and MRI of brain, MSCT-angiography of intracranial vessels and also traditional cerebral angiography. AVM of right-brain localization has been diagnosed in 40 patients, left-brain localization — in 69 ones. All patients were delivered to the hospital with the signs of urgent neurologic condition. Patient group was selected by the principle of random choice (table 1).

Table 1. – Clinical manifestation of brain AVM, abs. (%)

Criterion	Right-brain, n = 40		Left-brain, n = 69		Total, n = 109	
	men, n = 21	women, n = 19	men, n = 46	women, n = 23		
Age, years	20 ± 14	29.3 ± 8.6	31.8 ± 9.9	31.4 ± 10.0		
Size of AVM (a)	small	6 (28.6)	11 (57.9)	23 (50)	10 (43.5)	50 (45.9)
	big	14 (66.7)	7 (36.9)	20 (43.5)	10 (43.5)	51 (46.8)
	giant	1 (4.7)	1 (5.2)	3 (6.5)	3 (13%)	8 (7.3)
Convulsions (b)	18 (85.8)	14 (73.7)	38 (82.6)	20 (87)	90 (82.6)	
Hemorrhages	2 (9.5)	5 (26.3)	5 (10.9)	2 (8.7)	14 (12.8)	
Convulsions + Hemorrhages	1 (4.7)	–	3 (6.5)	1 (4.3)	5 (4.6)	

### Results

As it is seen from the table, the patients quantity with left-brain localization of AVM was 30% more than right-brain one. These differences were more evident among men. So, location of AVM in the left-brain in men has been observed two times more frequent than in women (46 and 23 respectively). Such strict interhemispheric dominance at AVM location in the right-brain has not been observed (in 21 men and in 19 women). Left-brain localization of AVM in men was two times more frequent than right-brain one (46 and 21 patients respectively).

Comparative analysis of AVM lateralization subject to patients age and sex presents special interest. So, patients-men with left-brain location were 11 years elder than men with right-brain location ( $31.8 \pm 9.9$  and  $20 \pm 14$  years respectively). At the same time, age difference among patient-women with different hemispheric AVM lateralization made up only 2 years ( $29.3 \pm 8.6$  and  $31.4 \pm 10$  years respectively).

While studying sizes and AVM lateralization subject to patients sex we got the following results. As it is seen from the table, AVM of small (45.9%) and medium (46.8%) sizes were detected more often and they in aggregate were diagnosed in 101 (92.7%) patients.

Giant AVM were detected only in 8 (8.3%) investigated patients with equal frequency among both men and women. The third part of giant AVM had left-brain lateralization.

Small sized AVM which were diagnosed in 50 (45.9%) patients also two times more frequent were located in the left-brain (from the right — in 17, from the left — in 33). Gender peculiarities in the small sized AVM structure were manifested by well-defined dominance of left-brain localization among men, small sized AVM in women had equal interhemispheric extension.

As it is presented in the table, big sized AVM were detected more frequent and they were located predominately in the left brain — in 51 (46.8%) patients among whom men were two times more than women (34 and 17 relatively).

Clinical semiology also depended from AVM lateralization and had gender differences. So, epileptic syndrome as partial attack with secondary generalization significantly more frequent has been observed at left brain lesion. In the pattern of epileptic attack partial convulsive tonic were dominated, in the single cases — non-convulsive, pseudoabsence attacks. Attacks frequency varied from 1–2 cases a month up to single attacks during a year. Attacks also were repeated on the background of taking antiepileptic drugs.

Cephalgia syndrome which was manifested in 80% patients had migrainous and in 20% — trigeminal nature. Unlike migraine, headache attacks at brain AVM are not followed by specific phases and have strict locality without hemicranial lateralization.

Hemorrhage into brain was in 14 (12.8%) patients and AVM in the right and left hemispheres were located with equal frequency. In 11 patients hemorrhage was subarachnoidal and in the rest 3 ones — parenchymatous—subarachnoidal.

Convulsive syndrome combined with hemorrhage into the brain can be regarded as the most severe clinical manifestation of AVM. Such combination of symptoms was in 5 patients, 4 of them had AVM of left-brain localization.

#### Conclusion

So, study of AVM sizes and its semiology subject to AVM lateralization has shown:

In majority of cases AVM are located in the left carotid system, predominately in the vessels of medial and anterior cerebral arteries;

Brain AVM two time more frequent occur in men and are detected in them at younger age. Small and big sized AVM with the left-brain lateralization dominate by pathomorphologic structure. The most frequent manifestation of AVM is cephalgic syndrome on which all patients complain. The pains have vascular and/or trigeminal origin. Epileptic syndrome is more often manifested in men, especially at left-brain localization of AVM. Epileptic syndrome has partial nature with secondary generalization, rarely pseudoabsence one is noted. Antiepileptic drugs have significant favorable effect at brain AVM. Isolated hemorrhage into brain and combination of epileptic syndrome with hemorrhage is not often observed (in 17.4% patients), but this combination is the most severe clinical manifestation of brain AVM.

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## Immunological aspects of the juvenile respiratory papillomatosis of the larynx

**Abstract:** This study was based on the analysis of clinical and immunological observations of 36 children with respiratory laryngeal papillomatosis of the age from 7 months to 15 years. We managed to establish deep T-cellular immune deficit which expressed in inhibition of the number of T-lymphocytes and T-helpers/inductors on the basis of increase in T-cytotoxic lymphocytes, natural killers, serum immunoglobulin A and activation of IL-6, which is important prognostic criterion in the formation and development of tumors of viral origin.

**Keywords:** Juvenile respiratory papillomatosis, cellular and humoral factors of immune system, IL-6, prognostic criterion.

### Background

The juvenile respiratory papillomatosis of the larynx (URP) is the most common benign tumor of the upper respiratory ways in children. Papillomatosis of the larynx accounts from 15.9 to 57.5 % of all benign tumors of the larynx. In the etiology of disease the intrauterine infection or contamination through the maternal passages have the main importance [1, 67–68; 4, 63–91; 8, 111–113; 19, 300].

Despite of significant increase of knowledge about etiology and immunopathogenesis of the laryngeal papillomatosis in the last decade many questions concerning mechanisms of the development of pathological process and progressing remain to be open. Until recently mechanisms of immune response were studied at a level of separate populations and cells of immune system, and such deeper mechanisms as cytokines, were insufficiently examined [6, 4–10; 7, 36–40; 14, 1645–1651; 15, 23]. It is known, that in development and progressing of the viral lesions the cellular and humoral factors of the immune system, particularly cytokines, have the important role, which are endogenous biologically active substances realizing intercellular interaction [7, 36–40]. Last years the more data have been collected about significance of immunological mechanisms in the development of one or another pathology иммунологических of mechanisms in development of this or that pathology, including at viral lesion of the larynx. Thus, according to the literature data infectious-inflammatory larynx processes result in deep damages of immunological reactivity [3, 8–12; 4, 63–91; 9, 37–40; 10, 22–25; 12, 777–786].

In this connection, we carried out evaluation of cellular and humoral factors of immune system as well as there was studied concentration of anti-inflammatory cytokine IL-6 and anti-viral interferon-alpha in the serum of peripheral blood of children with juvenile respiratory papillomatosis of the larynx.

### Material and methods

This study was based on the analysis of clinical and immunological observations of 36 children with respiratory laryngeal papillomatosis of the age from 7 months to 15 years receiving treatment in the ENT clinic of Tashkent Medical Academy (TMA). The period of follow-up was from 3 months to 10 years. This period of observation, on our opinion, is enough for discussion of efficacy of various methods of treatment and outcomes of disease.

There was isolated the group (out of total number) of patients with primary and frequent recurrent laryngeal papillomatosis

consisted of 14 and 22 children, respectively. Control group included 29 children of the analogue age and sex.

Immunological examination included determination of the neutrophilphagocytary activity, phagocytary index, blood serum concentrations of the major immunoglobulins (IgG, IgA, IgM) and circulating immune complexes in the serum of the peripheral blood (CIC big and small). Cellular immune parameters were measured by the contents of leucocytes, lymphocytes, total pool of T-lymphocytes (CD3+), T-helpers/inductors (CD4) and T-suppressors/cytotoxic lymphocytes (CD8+), ratio CD4/CD8 (immune regulatory index — IRI), B-lymphocytes (CD20+), as well as by expression of activate markers (CD38+, CD95+) on the lymphocytes. Immunological examinations were performed in the laboratory of immunocytokines of the Institute of Immunology of the Academy of Sciences of the Republic of Uzbekistan. The PCR diagnosis of YPV DNA in the brush-biopsies was performed, where there was identified type 11 VPC in all the studied patients. The serum concentrations of IL-6 and IFN-alpha were measured by IFA method with use of commercial test-systems “HUMAN” (Germany).

### Results and discussions

In the laryngeal papillomatosis the content of leucocytes in the peripheral blood, on the average, was not differed reliably between each other and in comparison with control. In group of children with primary process the reliable increase in comparison with lymphocyte content was noted in the control group and group of children with frequent-recurrent papillomatosis. It is known that CD3+, CD4+, CD8+ receptors are related to phenotype markers of T-lymphocytes. Analysis of the immunophenotype of T-lymphocytes in children with laryngeal papillomatosis showed reliable inhibition of CD3+ expression on the T-lymphocytes and its absolute value in group of children with primary papillomatosis in comparison with control group and children with frequent recurrences ( $P < 0.05$ ). Evidently, reduction of the general pool of T-lymphocytes (CD3+) was found due to number of T-lymphocytes, expressing marker CD4+. It is known that CD4+ T-cellular response to viral proteins is important mechanism of microorganism defense, because CD4+ T-helpers stimulates production of the antibodies by B-lymphocytes and activated CD8+ T-lymphocyte, specific against virus-infected cells [3, 8–12; 14, 1645–1651]. Thus, in the groups of children with papillomatosis of the larynx there was observed reliable inhibition of the CD4+ expression on the lymphocyte in comparison with control group. Interesting, that the most inhibition of the relative number of T-helper/inductor was charac-

teristic for group of children with frequent recurrent papillomatosis ( $p < 0.05$ ). In group of children with primary papillomatosis CD4+ T-helpers/inductors were reduced 1.5 times, and in the frequent recurrent — 1.8 times in comparison with control values. It is known, that cytotoxic CD8+ T-lymphocytes play the important role in the pathogenesis of viral diseases [3, 8–12]. The function of these cells is recognition of antigens on the cellular surface in complex with molecules of class I MHC. CD8+ T-lymphocytes play the leading role in the virus elimination, that may be explained, on the one side, by their ability to induce death of the infected cells, expressing the appropriate peptides, presenting by molecules of class I MHC, and, on the other side, by the ability to secrete antiviral factors. (proinflammatory cytokines — IFN- $\alpha$ , TNF- $\alpha$  and others) [7; 9]. Thus, in group of children with frequent-recurrent papillomatosis there was noted reliable increase of the relative content of CD8+ T-lymphocytes in comparison with data of control group and group of children with primary papillomatosis of the larynx. Consequently, immunoregulatory index in group of children with frequent recurrent papillomatosis of the larynx was considerably inhibited and was  $0.81 \pm 0.02$  ( $p < 0.05$ ). Obviously, the decrease in immune regulatory index is an important criteria of the deepness of T-cellular immune deficit state in the frequent-recurrent papillomatosis of the larynx.

The natural killer cells (NKC), which are the third population of lymphocytes providing supporting of genetic homeostasis, which were differed significantly from T- and B-lymphocytes by phenotype and functions. They are related to the category of the main effectors of natural or congenital immunity, which are able to lyse cells-targets or to induce antibody dependent cellular toxicity. NKC participate in the antiviral, antibacterial and antiprotozoa defense. We revealed reliable increase in relative and absolute values CD16+ in the both studied groups of children in comparison with values of control group. It was shown that parallel with T-lymphocytes B-lymphocytes are the main effectors of immunity. The function of B-lymphocyte in struggle of body against infection is the production of antibodies. Thus, the relative and absolute values of B-lymphocytes in all studied children with laryngeal papillomatosis remained in the control limits that testify to active participation of B-lymphocytes in the antiviral immune response. And at the same time, it is known that their protective efficacy under the conditions of viral persistence is limited [17, 27; 18, 144]. It was established that functional insufficiency of B-lymphocytes in the antiviral immune response was characterized by production of immunoglobulins [17]. They play important function as mediators in the cascade development of immune response and partially may be responsible for efficacy of final effector reactions of cellular immunity for inactivation and elimination of viral antigens [5, 311–312; 17, 27]. The investigations showed that serum concentrations of the main IgG and IgM in children with papillomatosis of the larynx remain to be in the limits of the control indicators, and serum content of IgA was reliably increased in the both studied groups of children in comparison with control group ( $p < 0.05$ ), however, there were no reliable differences between groups.

Study of activational lymphocyte markers particularly in infectious disease, especially in papillomatosis because analysis of activational lymphocyte markers allows to study processes of activation, proliferation, differentiation and apoptosis of immunocompetent cells and characterizes cellular cycles associated with processes of great scientific and practical significance [5, 311–312]. CD8+ is the activational marker which is considered as multifactorial protein that is ectoenzyme catalyzing synthesis and hydrolysis of CADF-ribose. Fermentative functions of CD38+ provide its main immunoregulatory role that is binding of various agents by

this receptor that provides enhancement of the cytokine synthesis, kinase activation and protein phosphorylation [5, 311–312]. CD38+ is the precursor of the plasmatic cells which expresses on the immature T- and B-lymphocytes, activated T-lymphocytes, plasmacytes. We revealed reliable increase in expression of CD38+ on the lymphocytes in the both studied groups of children with papillomatosis ( $p < 0.05$ ). According to literature data there is evidence about role of APO-1/Fas (CD95+) receptors during apoptosis, and its degree reflects lymphocyte apoptosis level [5, 311–312]. The growth of the expression of receptor CD95+ on the lymphocytes indicated about apoptotic way of lymphocyte death. Thus, we showed increased expression of CD95+ on the lymphocytes of peripheral blood of children with laryngeal papillomatosis, and significant increase in apoptosis of the lymphocytes was revealed in the group of children with primary papillomatosis. Evidently, the excessive apoptosis in papillomatosis in combination with humoral immunity and deep T-cellular immune deficit contributes to progressing disease. It is known that CD23+ is specific receptor of the immunoglobulin E. This receptor presents on the surface of 30% of B-lymphocytes and 1% of the t-cells and monocytes. Under the influence of IL-4 CD23+ begins to be produced by B-cells and monocytes in the soluble form [5, 311–312; 7, 36–40]. It is known that high levels of CD23+ are observed in infectious diseases [5, 311–312]. Expression of the CD23+ molecule is rather increased in children with laryngeal papillomatosis, particularly in children with primary papillomatosis.

One of the important directions in the modern medicine working on the junction with molecular biology, is to study the role of cytokines in the pathogenesis of the infectious diseases and their complications. The cytokines are considered as proteins of low molecule weight which are produced by cells of various cells and are mediators of intercellular interactions in immune response [8]. We studied the serum concentration of proinflammatory cytokine IL-6 and antiviral interferon-alpha (IFN- $\alpha$ ). Comparative analysis of IL-6 in children with papillomatosis of the larynx in various studied groups revealed presence of the reliable difference with values of control groups ( $p < 0.05$ ). In group of children with frequent-recurrent papillomatosis there was found reliable increase in value of IL-6 in comparison with data of children with primary laryngeal papillomatosis. The data obtained indicated about important diagnostic role of IL-6 in progressing of laryngeal papillomatosis. It is known that IL-6 is glycoprotein that is pleiotropic cytokine of broad diapason of biological activity and is produced both by lymphoid and non-lymphoid cells of the organism. It was established that IL-6 regulates immune and acute phase response, inflammation, oncogenesis and hemopoiesis [5, 311–312; 7, 36–40]. One of the main functions of IL-6 is regulation of the processes of maturation of the antibody-producing cells from B-lymphocytes and of production itself of immunoglobulins. Thus, we revealed considerable increase in IL-6 serum concentration in the group of children with laryngeal papillomatosis, and maximal value of IL-6 was noted in group of children with frequent recurrent papillomatosis of the larynx.

It is established that disturbance of the cytokine balance, directed to hyperproduction of IL-6, is accompanied by excessive symptoms of inflammation and sometimes it is the central chain of the pathogenesis of viral lesions at the systemic level. It is known that asthenic syndrome was the characteristic clinical manifestation of the laryngeal papillomatosis in children, such signs of disease as weakness, flaccidity, subfebrile temperature, poor appetite which are under control of the cytokine system. Similar suggestions are supposed by other authors [6, 4–10; 7, 36–40; 9, 37–40; 17, 27; 18, 144].

The system of interferons is the integral part of the immune system which provides coordination of proliferation, differentiation and activation of effector cells of the immunity. The interferon status is the assessment of the functional state of the interferon system [7]. It is known that IFN- $\alpha$ , playing one of the main roles in the viral elimination, has direct antiviral effect as well as indirect immunomodulating activity. IFN- $\alpha$  is produced almost by all the cells of the body, but most of all by macrophages and lymphocytes. IFN- $\alpha$  is the strong antiviral protein [8]. Analysis of the results showed that the serum content of IFN- $\alpha$  in the group of children with primary papillomatosis of the larynx was reliably increased in comparison with data of the group of children with frequent recurrences and children of control group. Thus, in group of children with primary recurrence the level of IFN- $\alpha$  was increased 3.5 times in comparison with control group

and 2.4 times — with values of children with frequent recurrences. Evidently in cases of frequent recurrences of disease the exhaustion of the reserves of the interferon system that is accompanied by inhibition of the IFN- $\alpha$  production.

Thus, our investigations allowed revealing reliable changes in the functioning of the immune system of the children with laryngeal papillomatosis. Our purpose was to find the most vulnerable indicators of the immunity which may be served in the further as important diagnostic, therapeutic and prognostic criteria in laryngeal papillomatosis in children. We managed to establish deep T-cellular immune deficit which expressed in inhibition of the number of T-lymphocytes and T-helpers/inductors on the basis of increase in T-cytotoxic lymphocytes, natural killers, serum IgA and activation of IL-6, which is important prognostic criterion in the formation and development of tumors of viral origin.

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## The role of thrombophilia genetic determinants in the clinical course of hemophilia

**Abstract:** In the article studied the effect of thrombophilia genetic markers (FII, FV and MTHFR) on the clinical course of hemophilia A. For this purpose we studied DNA samples from 75 apparently healthy donors (control group), 36 patients with

severe and 38 patients with mild form of hemophilia A. The obtained results did not support the version of the development of the genetic-compensatory mechanism in the organism of patients with hemophilia in the form appearance of the defect in the genes of thrombophilia and do not allow to make a definitive conclusion about the patterns governing the course of hemophilia in the persistence of the combined forms of thrombophilic mutations.

**Keywords:** thrombophilia, hemophilia, genes FII, FV, MTHFR.

Until now, the severity of hemorrhagic syndrome was explained only by the low concentration of the coagulation factors (hemophilia A and von Willebrand's disease, etc.) in patients with the hemostatic system disorders. However, recently, several authors noted that in the same level of the clotting factors deficiency, the clinical manifestations of the disease can greatly vary, especially in patients with severe and very severe forms of hemophilia [3; 5–11; 13].

In this regard, an active search were conducted for the causes of the high variability of phenotypic manifestations of hemophilia, among which, it was not possible underestimate the contribution to the mutations or polymorphisms of some genes anticlotting hemostatic system under which there is a significant reduction in clinical severity of the disease. Of these, the most significant point mutations are:

- G1691A — in the gene for factor V – Leiden mutation (rs6025);
- G20210A — in the prothrombin gene II (rs1799963);
- C677T — in the gene of methylenetetrahydrofolatereductase (MTHFR, rs1801133). However, the results of some studies on the contribution of these mutations in the clinical course of hemophilia A (HA) are quite controversial [3; 4; 12; 13].

Taking into consideration the novelty and the lack of information on such issues, the aim of this work was to study the relationship between gene mutations FII, FV (whose products are in the same biochemical pathway with FVIII), and the enzyme MTHFR c clinical course of the GA.

#### Materials and methods

Materials for the study were the DNA samples from 74 patients with HA and 75 apparently healthy donors (control group). GA group patients were divided into 2 groups:

- the subgroup of patients with a severe form – factor VIII level was 3.1 % (36 patients, 5 of them intron 22) with inversion mutation;
- the subgroup of patients with mild form – the level of factor VIII was more than 5 % (38 patients). The average age of the patients was  $22.6 \pm 4.6$  years.

The clinical diagnosis of HA were applied clinical, genealogical and hemostasis standard survey techniques.

Samples of genomic DNA were isolated from leukocyte fraction according to standard procedures. MTHFR C677T gene polymorphism, the FV G1691A and FII G20210A were determined by PCR (Applied Biosystems-2720, USA) and PCR in a “real time” (Rotor-Gene 6000, Australia). Visualization of DNA fragments was performed in transmitted UV light after staining the gel with ethidium bromide. Interpretation of the results was carried out

according to the instructions for the test systems manufacturer (OOO “AmpliKit” of St.-Petersburg and OOO “GenoTehnologiya”, Moscow).

Statistical analysis of the results carried out by using statistical software package «OpenEpi 2009, Version 2.3». The differences between the control and the test groups were calculated with odds ratio (OR) with 95 % confidence interval (CI). The predictive efficacy (AUC-qualifier) of the genetic markers was determined by the standard formula:

$$AUC = (Se + Sp) / 2,$$

where Se and Sp — the sensitivity and specificity of a genetic marker, respectively.

If the index  $AUC < 0.5$ , the marker — the occasional qualifier;  $AUC = 0.5–0.6$  — bad;  $AUC = 0.6–0.7$  — medium;  $AUC = 0.7–0.8$  — good;  $AUC > 0.8$  — great classifier [14].

#### Results and discussion

At the beginning of the study, we investigated the prevalence of allelic variants of genes inherited thrombophilia — factors FII prothrombin (G20210A) and FV–Leiden, and MTHFR (C677T) in 75 apparently healthy donors, which had not the history of thrombotic episodes.

The frequency of allelic polymorphism G20210A prothrombin gene FII in the studied group of healthy Uzbek nationality donors had a relatively low rate — 1.3 % (1/75), indicating the particular genetic marker of population (Table. 1).

It is appropriate to emphasize that the G20210A polymorphism in the vast majority is found only in some populations of Europe and the white Americans. Among the Asian population this polymorphism is very rare or absent.

In the HA group of patients, the frequency of this marker was 2.7 % (2/74). In this case, the difference in the frequency distribution of the polymorphism among the studied group of general patients and healthy donors was not statistically significant ( $\chi^2 = 0.3$ ;  $P = 0.5$ ; OR = 2.1; 95 % CI 0.1824, 23.17). It was found that in the subgroup of patients with mild GA, this mutation is detected in 2 times more often than in the control group (2.6 % and 1.3 %, respectively,  $\chi^2 = 0.2$ ;  $P = 0.6$ ; OR = 2.0; 95 % CI 0.1217, 32.88). However, this difference was not statistically significant. In addition, the difference in this indicator between this subgroup of patients, and the subgroup of patients with severe HA also was insignificant (2.6 % and 2.8 %, respectively,  $P > 0.05$ ).

The calculated rate sensitivity of this marker has been very low and consistent with  $SE = 0.027$ , the value of specificity, on the contrary — very high —  $SP = 0.99$  (Table 2).

Table 1. — Distribution of thrombophilia gene polymorphism in hemophilia patients and hemophiliogene carriers

Studied groups and subgroups	n	Genes					
		Factor II		Factor V		MTHFR	
		n	%	n	%	n	%
Control group	75	1	1.3	2	2.7	31	41.3
The core group, including:	74	2	2.7	3	4.0	34	46.0
Subgroup with severe HA	36	1	2.8	1	2.8	18	50.0
Subgroup with mild HA	38	1	2.6	2	5.3	16	42.1

Table 2. – Indicators of prognostic efficiency of thrombophilia markers

Genetic marker	SE	SP	AUC	OR (95 %CI)	*p
FII G20210A	0.027	0.99	0.51	2.1 (0.1824–23.17)	0.9
FV G1691 A	0.040	0.97	0.51	1.5 (0.2502–9.506)	0.9
MTHFR “C677 T”	0.460	0.59	0.52	0.8 (0.4335–1.585)	0.2

Note: SE — sensitivity; SP — specificity; AUC — prognostic efficiency, \*p — Fisher's accuracy test.

Evaluating the effectiveness of the labeling marker was also very low, and was AUC = 0.51. These data suggest that the rare mutation of G20210A prothrombin gene FII is ineffective classifier to label the clinical course of hemophilia, even when OR = 2.1.

In turn, the mutant allele — Leiden gene FV among controls was found in 2/75 cases (2.7%) and was present in both cases, the heterozygous genotype. In the total group of patients with hemophilia frequency of this polymorphism was 4.0% (3/74). In this case, the difference in the frequency of the carrier of genetic markers for these groups also was statistically significant ( $\chi^2 = 0.2$ ,  $P = 0.6$ ; OR = 1.5; 95% CI 0.2502–9.506).

In the studied subgroup of patients with a mild form of HA mutant allele — Leiden was met by more than 2 times higher than in the control group (5.3% and 2.7%, respectively). However, this difference also did not reach statistical significance level ( $\chi^2 = 0.5$ ;  $P = 0.5$ ; OR = 2.03; 95% CI 0.2744, 14.98). Although OR = 1.9 comparative analysis of the frequency of this mutation in the subgroups of patients with mild and severe forms of HA also showed statistically insignificant differences (5.3% and 2.8%, respectively,  $\chi^2 = 0.3$ ;  $P = 0.6$ ; OR = 1.9; 95% CI 0.1686–22.42).

SE and SP indicators were equal to 0.04 and 0.97 respectively, and the evaluation of AUC efficiency was equal to 0.51 (Table 2). These figures also indicated a low degree of predictive value of polymorphism G1691AFV gene as an independent marker.

It is interesting to note that the highest frequency of occurrence in the groups studied had the mutation of “C677T” MTGFR gene. The frequency of this mutation among healthy individuals was 41.3% (31/75), including 29 individuals (97.3%) had heterozygous and 2 (2.7%) homozygous genotype.

In the core group of patients the incidence of mutation C677T MTHFR gene was 46.0% (34/74), among them 91.2% had heterozygous, and 8.8% — homozygous genotype. In this case, the detected difference between the main and control groups did not reach the limits of statistical significance ( $\chi^2 = 0.3$ ,  $P = 0.6$ ; OR = 0.8; 95% CI 0.4335–1.585). The difference in the frequency of the carrier of the genetic marker among the surveyed subgroups with severe and mild forms of hemophilia and was statistically significant (50.0% vs. 42.1%, respectively,  $\chi^2 = 0.5$ ;  $P = 0.5$ ; OR = 1.4; 95% CI 0.5494, 3.441).

For this polymorphism the indicators of sensitivity and specificity showed an average values and correlated SE = 0.46 and SP = 0.59 (Table. 2). The calculated ratio of AUC (0.52) also demonstrated the low level of efficiency polymorphism “C677T” MTGFR gene as an independent candidate gene.

Given the high correlation between homozygous form carrier C677T MTHFR gene mutation with hyperhomocysteinemia and followed by hypercoagulability, we hypothesized that there may be mild developmental disorders of hemostasis hypercoagulable character in individuals with the homozygous form of polymorphism, even if the GA. However, in our case, in patients with the presence of homozygous mutations was not observed the clinical manifestations of thrombosis and complications. Perhaps this is due to the fact that genetically determined procoagulant activity of these individuals, and thrombophilic phenomenon could not be

fully realized due to a defect in the coagulation cascade, caused by deficiency of factor VIII. In these patients, were not excluded the possible absence of exogenous provoked factors, that could activate the trigger mechanisms of prothrombotic changes in the hemostatic system.

One important aspect in the study of the genetic bases of forecasting the severity of the particular disease, is the interaction of genes, so-called gene-gene interactions.

Among studied 74 patients, only in 2 cases were detected the simultaneous carriage of alleles “FV + MTHFR” (2.7%) and one “FII + FV” (1.35%), whereas in the control group of such combinations was not observed. However, due to the relatively small number of investigated persons in the studied groups, the obtained data doesn't allow to make a definitive conclusion about the governing patterns on the hemophilia course, and in combined thrombophilia mutations gene carriers.

#### Discussion

Despite a number of ongoing and fairly intensive works, associated with the study of the effect of thrombophilic manifestations on the course of coagulopathy, the data on the formation of individual predisposition to certain thrombotic manifestations in patients with bleeding diathesis remains highly controversial.

In our studies, it was shown that the presence of polymorphic loci of genes FII, FV, MTHFR, predisposing to thrombosis, does not make an independent contribution to the development of a hypercoagulable state in patients with GA, confirming the version of some authors [3; 4; 12].

It should be noted the absence of significant differences between our results and those of Turkish colleagues. Thus, two groups of Turkish researchers have shown the absence of any effect on thrombotic factors for hemophilia varying severity [3; 12]. Taking into account the population and ethnic characteristics of genetic polymorphisms, these data may indicate high genetic affinity between our two Turkic peoples.

However, in the most of such studies were found association of prothrombotic gene alleles with clinical course of hemophilia. For example, Nowak-Gottl U.S. et al. (2003) and Kurnik K. et al. (2007) in their studies emphasize that the clinical phenotype of hemophilia A in childhood depends from the presence of hereditary thrombophilia factor [8; 10].

López-Jiménez J.J. et al. (2009) in their studies emphasize the association only FII 20210A and FV Leiden genetic markers with severe hemophilia clinical course [9]. Franchini M., et al. (2010) and Van Dijk K. et al. (2004) in their review analyzes showed the association between FV Leiden and severe form of HA, this the genetic factor significantly reduces the clinical severity of the disease. Thus, Van Dijk K. et al. (2004) considered the association thrombophilic other factors inconclusive [13].

Other researchers showed the reduction of the number of spontaneous bleeding and arthropathy in carriers of a point mutation factor FII 20210A compared with patients who do not have this mutation [11].

There is an interesting hypothesis about the positive association between the thrombotic factors and the inversion mutation

gene intron 22 of FVIII [11]. According to investigation dates of K. T. Boboev (2011) in Uzbekistan, the proportion of the intron mutation inversion in patients with severe HA consists about 41 %. In this paper was investigated the subgroup of patients with severe HA and patients with the presence of the mutation in the gene for FVIII. However, the frequency of thrombophilic mutations among these patients was close to the common population index. A small number of such patients did not allow us to made final conclusion on the association between this form and thrombophilic mutations [1]. It should be noted that some authors in their studies found significant associations between different factors of thrombophilia with von Willebrand's disease — another representative of plasma hemostasis disorders. Thus, Franchini M. et al. (2006) and Ahmad F. et al. (2010) argued, that the prothrombotic markers FII, FV and MTHFR significantly affect the course of von Willebrand's disease [2; 7].

In our opinion, such contradictory data is primarily associated with population characteristics of the studied markers, also with the heterogeneity of the studied groups of patients and of healthy individuals, and showed the significant difference in the number of patients tested in all studies.

Thus, our results do not reliably prove versions of some of the authors of the presence of genetic compensatory mechanism in the organism of patients with severe hemophilia, that form a defect in the genes of anticoagulative hemostatic and fibrinolytic systems. As Franchini M. et al. (2009), we also consider that for the final evaluation of the prognostic value of mutations in determinants genes of hereditary thrombophilia, as well as dysfunction of the protein in a cascade of clinical manifestations of hemophilia, apparently, needs more study patients and longer follow-up of these patients [6]. In addition, it would be interesting to extend the range of the studied genes determinants of hemostasis systems.

#### Conclusions:

1. The impact of thrombophilic mutations on the phenotypic variability of the manifestations of current hemophilia is not significant.
2. The thrombophilic markers are ineffective independent classifiers for marking the clinical course of hemophilia.
3. For the final evaluation of the correlation of gene-gene interactions hereditary thrombophilia with clinical manifestations of hemophilia is necessary to expand the range of genetic markers of thrombophilia and significantly increase the number of patients tested.

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## About the combined effect of gas and gas-aerosol binary mixes of chemical components at their long-term inhalation exposure to the organism

**Abstract:** This work presents the results of experimental researches on study of character of resorption effect of ammonia with hydrogen fluoride and formaldehyde with lead acetate at their long round-the-clock inhalation exposure. It is established, that the character of the combined action of the investigated binary mixes at inhalation exposure to the body of animals is shown as effect of "incomplete summary".

**Keywords:** gas pollution, atmospheric air, inhalation, pollution exposure, animals, population.

### Background

The study of the factors forming health of the population, has shown, that from them about 50% is the share of social-economic conditions and life style, 18–25% — biological and genetic data, 10–20% — natural-climatic and environment effects, 10–15% is the share of organizations of the system of public health service [7], i. e. the social and ecological factors are leading among the other reasons influencing on the human health. In many cities of Republic of Uzbekistan (Almalik, Angren, Samarkand, Chirchick, Bekabad, Tashkent etc.) the pollution of the ambient air by the harmful chemical substances containing in the industrial emissions and exhaust gases of a vehicle seem to be hazardous factors for health of the population.

Annually in the atmospheric air from stationary and mobile sources the significant quantity of harmful substances, such as ammonia, fluoride hydrogen, formaldehyde, lead and others penetrate [1; 3].

As it is known, the human living in the industrial cities, as a rule, is exposed to inhalation effect from the toxic substances for a long time. Thus the toxic substances contained in the atmospheric air, at inhalation enter the respiratory ways not isolated, but in various combinations and associations. In this case assessment of the

danger of the total environment pollution, risk for the health of population, study of the combined action of industrial poisons and rate setting of the mixes of toxic substances in the atmospheric air is one of the acute problems of hygienic science in the field of municipal hygiene [2; 4–6; 8–9].

The **purpose of research** was the experimental study of the character of resorptional action of ammonia with hydrogen fluoride and formaldehyde with lead acetate at their twenty-four-hour inhalation way of penetration; revealing of general rules of the character of combined action of binary mixes and their standardizing in the atmospheric air.

### Methods and volume of research

In order to study the character of biological effect of ammonia (AM) with fluoride hydrogen (FH) and formaldehyde (FA) with lead acetate (LA) on the body there were performed chronic experiment on 120 male rats, weight 100–130 gr., which were divided into 2 series of 4 groups having 15 individuals in everyone. For inhalation effect of the mixes in experiment there were used 200-liter chambers offered by B. A. Kurlandskiy. In this case group 4 of animals in each series of experience was control. The actual concentration of chemical components, administrating into the body of animals in the chambers presented in Table 1, in chambers are submitted in the table 1.

Table 1. – Actual concentration of chemical components in the chambers

№ series	Ingredients of mix	Group №	Number of animals	Chemical substances, mg/m <sup>3</sup>				Summary ratio exceeding LAC cr
				HF	AM	FA	LA	
I	Hydrogen fluoride and ammonia	1	15	0.1	0.29	–	–	47.25
		2	15	0.1	0.13	–	–	11.20
		3	15	0.0015	0.025	–	–	1.22
		4	15	clean	air	–	–	Control
II	Formaldehyde Lead acetate	1	15	–	–	0.1	0.015	83.3
		2	15	–	–	0.012	0.001	7.33
		3	15	–	–	0.02	0.0003	1.33
		4	15	–	–	clean	acetate	Control

The definition of the contents of fluoride hydrogen (FH), ammonia (AM), formaldehyde (FA) and lead acetate (LA) in air of the exposure chambers was carried out with use of colorimetric method every day [10].

In four-month chronic experiment prior to the beginning of researches (background) on 15, 30, 45, 60, 75, 90, 105, 120 day and in the recovering period of the laboratory animals there were investigated following physiological, biochemical, hematological, gonadotoxic characteristics: a level of hemoglobin, erythrocytes and leucocytes in the peripheral blood; summary-threshold parameter (STP) on the electronic device «Pulse» by method of S. V. Speranskiy in

modification of S. M. Pavlenko; activity of cholinesterase (CE) of the integral blood by the method of Churstrin in modification of B. N. Krivoglas; content of lysozyme in the blood serum by method of V. T. Doropheychuk; catalase activity in blood by method of Bach and Zubkova; content of SH-grupps in the blood by method of Kh. N. Rubina, L. A. Romanchuck; activity of aminotraspherases (ALT, AST) in the blood serum by A. A. Pokrovskiy; activity of alkaline phosphatase (AF) in the blood serum by method of Bogdanskiy in modification of A. N. Yakhnina; activity of sorbitoldehydrogenase (SDH) in the blood serum with use of Varburg test; determination of the le) by method of Barker and Samperson, and

pyruvic acid (PA) by method Umbrite; the contents of urea in the blood serum with the help of test-system «Lahema», spermatozoon mobility time, general embryonal mortality, prior- and postembryonal mortality by method of I. V. Sanotskiy.

The data about resorption effect of the studied substances in the chronic experiment underwent the statistical processing, with calculation of Student's criterion (t) and probability of a mistake (P). Differences of mean values were considered to be reliable at the level of reliability  $P < 0.05$ .

### Results and discussion

At study of biological effect of binary mixes on the body of animals it was established, that at total administration the biological effect of chemical substances was characterized by dependence "concentration — effect", the there was found "increase in effect". The analysis of changes of biochemical, physiological, hematological, entero- and gonadotoxic parameters, occurring in the body of animals, indicating, that FH + AM and LA + FA at the combined administration under conditions of chronic experiment provide also general toxic effect, expressing in the disorders of CNS, liver, blood and enzymes and spermatozoons functional state (table 2).

Table 2. – The data on biological action of binary mixes under conditions of chronic 4-month experiment

Parameter	Ingredient					
	Hydrogen fluoride + Ammonia			Lead acetate + Formaldehyde		
	Summary ratio exceeding LAC cr					
	47.25	11.2	1.22	83.3	7.33	1.33
Body mass	–	–	0	–	–	0
STP	+	–	0	+	+	0
CE	+	+	0	+	–	0
ALT	+	–	0	+	–	0
SDH	+	–	0	+	–	0
AF	+	–	0	+	–	0
SH-group	+	–	0	+	–	0
Lysozyme	+	–	0	+	–	0
Urea	+	–	0			
Catalase	+	–	0			
Ratio Albumin/Globulin	+	–	0			
Leucocytes	+	+	0	+	–	0
Erythrocytes	+	+	0	+	–	0
Hemoglobin	+	–	0	+	–	0
Spermatozoon functional state:						
– moving time	+	–	0	+	–	0
– osmotic resistance	+	–	0	–	–	
– acid resistance				–	–	
Total embryonic mortality	+	–	0			0
Preembryonic mortality	+	–	0			0
Postembryonic mortality	+	–	0			

Note: «+» — reliable,  $P < 0.05$ ; «–» — unreliable changes  $P > 0.05$ ; «0» — absent changes.

During study of general rules for the combined exposure of formaldehyde and lead acetate on the rat body it was established, that the investigated chemical substances at total administration rendered also more expressed biological effect on body, than at the isolated entering. Thus, in rats of group 1 of the 1<sup>st</sup> series of experiment, inhaling formaldehyde in concentration  $0.1 \text{ mg/m}^3$ , lead acetate  $0.015 \text{ mg/m}^3$  there were also established changes of STP, activity of CE, ALT, AST, SDH, AP, SH-groups, lysozyme, picture of blood and spermatozoons movement time. In the rats of group 2 of the second series of experiment inhaling formaldehyde in concentration  $0.012 \text{ mg/m}^3$  and lead acetate  $0.001 \text{ mg/m}^3$  there were observed single reliable changes only at the end of experiment in relation to STP. In the rats of group 3 of

So, for example, at twenty-four-hour inhalation exposure of the white rats from group 1 of the 1<sup>st</sup> series of experiment inhaling fluoride hydrogen in concentration  $0.1 \text{ mg/m}^3$  and ammonia  $0.29 \text{ mg/m}^3$  during 120 days there were established some reversible changes in 94.7% of the studied parameters (19 of 21 studied) of the central nervous system (STP), of the blood picture (erythrocytes, leucocytes, hemoglobin), enzymatic system (ALT, AST, SDH, AF, SH-group, CE), spermatozoon functional state (spermatozoons movement time, osmotic resistance), that show polytropic toxic effect of the mix of hydrogen fluoride with ammonia. The specified shifts developed much faster, since 60–75 days of influence. In the rats of 2–1 group of the 1<sup>st</sup> series, inhaling hydrogen fluoride in concentration  $0.02 \text{ mg/m}^3$ , ammonia  $0.13 \text{ mg/m}^3$  there were revealed insignificant changes in 19% of the studied parameters such as CE, AST, leucocytes, erythrocytes, which were noted only at the end of the fourth month of experiment. In the rats of group 3 of the 1<sup>st</sup> series of experiment, inhaling the hydrogen fluoride in concentration  $0.0015 \text{ mg/m}^3$  and ammonia  $0.025 \text{ mg/m}^3$  the any reliable changes in comparison with the control were not revealed.

the 2<sup>nd</sup> series of experiment 2 series of experiment there were not observed any reliable changes in comparison with the control.

On the basis of results of investigations there has been determined threshold and subthreshold concentrations of the studied mixes, the coefficients of the combined effect ( $C_{CE}$ ) have been calculated. The values of the latters depended both on application of parameters, and from components making mixes.

According to experimental data at combined presence in the atmospheric air the sum of shares of hydrogen fluoride and ammonia should not exceed 0.6 MAC (maximum allowable concentration), and at joint presence of formaldehyde and lead acetate 0.68 MAC of each substance separately.

**Conclusions:**

1. The hydrogen fluoride in concentration  $0.02 \text{ mg/m}^3$ , ammonia —  $0.13 \text{ mg/m}^3$  at combined presence at atmospheric air and formaldehyde —  $0.012 \text{ mg/m}^3$ , lead acetate —  $0.001 \text{ mg/m}^3$ , causing changes CE, AST, leucocytes, erythrocytes in the first case and STO in the second case, these concentration of the investigated substances are threshold concentration.

2. The character of the combined action of hydrogen fluoride with ammonia and formaldehyde with lead acetate at inhalation exposure to animals body is shown as effect “incomplete sunnary”.

3. At combined presence in the atmospheric air the sum of shares of hydrogen fluoride and ammonia should not exceed 0.6 MAC (maximum allowable concentration), and at joint presence of formaldehyde and lead acetate 0.68 MAC of each substance separately.

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## Age peculiarities of individuals of young school children

**Abstract:** The aim of the study is the stable traits and behaviors in children 7–12 years old and working characteristics centile of 12 factors of personality traits depending on the age and sex of younger schoolboys living in the Fergana Valley of Uzbekistan. The main method is an adaptation of personality questionnaire R. Cattell on 12 factors of personality traits for the study of children aged 8–12 years. The data obtained from the test survey, identify qualitative features of personality characteristics in children 7–10 and 11–12 years. In general, it revealed good social adaptability, a good level of intellectual ability, dependence on others, emotional sensitivity, tendency to intropunitiveness and phobias. The research results can be a scientific rationale for planning and carrying out in-depth medical examination of neuropsychiatric younger schoolchildren of 7–12 years.

**Keywords:** Personal factors, children, standards.

Questionnaires such as 16-PF, HSPQ, CPQ are widely used in foreign countries in order to estimate the personal development of a child. But the usage of foreign pshycodiagnostic methods in our conditions demand serious adaptation and restandartization. These and other requirements were taken into consideration by us in using the questionnaire of children’s personality R. Cattell (CPQ) among schoolchildren of secondary schools (7–12 years old) of Andizhan city.

**The aim** of our research is to study the stable and styles of children’s behavior of 7–12 years old and the work out of centile characteristics of 12 personal peculiarity factors depending on the age and sex. A wide network of characteristics identified by the help of this method enables to depict the children’s population of the given age diapason wholly.

After the correction or replacement of a part of the questions considering the cultural social conditions of our region, the

testing material method was approbated on 1200 schoolchildren of 7–12 years old. Standardization of the adapted variant of the questionnaire of 12 personal peculiarity factors was carried out on 500 schoolchildren.

**The results of the research** on standardization and work out of centile normative of 12 personal peculiarity factors by the method of R. Cattell are given in the tables 1, 2.

Standardization results of personality peculiarities of 7–12 years old schoolchildren was given in table 1 by taking into consideration the sex of the investigated. Relative stableness of the standardization of personality peculiarities depending on the age was established, but the difference of some investigated readings depending on the sex ( $P < 0.05$ ) was defined. The given literature indicates that high readings by the factor “A” characterizes the child as an emotional, sociable, happy person.

Children with high sense of this factor are far more adapted to society. In average girls and boys in our investigation have high readings ( $6.0 \pm 0.4$  и  $6.0 \pm 0.33$  correspondingly in boys and girls) by this factor. Average readings shows good social adaptation and successful possession of environmental norms by the factor «Q3» ( $5.48 \pm 0.2$  and  $6.1 \pm 0.42$  correspondingly in boys and girls).

Personality factor “B” reflects the level of development of verbal intellect and its functions as generalization separation from the generality, possession of logic and mathematic operations, easiness of obtaining new knowledge. In population of children of 7–12 years by the method of R. Cattell this datum ( $5.0 \pm 0.27$  and  $5.4 \pm 0.29$  correspondingly in boys and girls) shows the formation of intellectual functions, sufficient development of abstract form of thinking in the whole.

Factor «C» ( $4.34 \pm 0.42$  and  $3.9 \pm 0.9$  correspondingly in boys and girls) reflects the self confidence and correspondingly the calmness stableness best training to successful completion of school demands.

Children’s high desire of the leadership, opposed to both children and adults is indicated in the evaluation by the factor «E». The manifestation of this feature in children is seldom accompanied with behaviour problems, aggression, as their leadership tendencies don’t often find the reality and most forms of social interaction they will have to learn. In the investigated population of 7–12 year old children this factor is equal to  $3.64 \pm 0.35$  and  $3.0 \pm 0.48$  correspondingly to boys and girls. Low readings of this factor demonstrates the dependence on adults and other children, and easiness of subordination.

As seen the above mentioned is the result of peculiarities of upbringing and social cultural conditions of our region.

A child who has a high evaluation by the factor «Q» is easily disappointed that shows bad mood. High score can be a datum of alarmness and depression depending on the situation it is the basis of appearance of neurosis ( $4.66 \pm 0.26$  and  $4.9 \pm 0.27$  in boys and girls). Children with high estimation by the factor “D” identifies the high excitement or hyperactivity on weak stimuli, their hyperactivity is sometimes accompanied with self confidence. Motor worry, distraction, insufficient concentration is peculiar to them.

Formation of this quality is linked with both peculiarities of temperament and conditions of upbringing. Low estimation by this factor is explained as emotional equilibration, restraint. In our investigations we identified rather high sense in boys than in girls (in the average  $4.2 \pm 0.13$  against  $2.8 \pm 0.42$ ,  $P < 0.01$ ). The importance of this factor is rather high in 11–12 year old schoolchildren than in 7–8 year old ones.

Children who have high estimation by the factor “F” are differentiated by their energy, absence of fear in the situation of increased risk. They, as a rule, have the peculiarity of overestimation of their abilities and hyperoptimism. The importance of the factor “F” reflects the sex difference: boys ( $4.64 \pm 0.25$ ;  $P < 0.001$ ) comparing with girls ( $3.0 \pm 0.3$ ) show rather high scores.

Table 1. –Results of the questionnaire of standardization method of children’s personality by R. Cattell for schoolchildren of 7–12 years (in special units)

	Sex	Factors of personality features											
		A	B	C	D	E	F	G	H	I	Q	Q3	Q4
B aver.	B	6.0	5.0	4.34	3.15	3.64	4.7	4.7	5.53	5.64	4.66	5.48	4.0
	G	6.0	5.4	3.9	2.8	3.0	5.7	5.7	5.4	5.4	4.9	6.1	4.1
Δ	B	0.8	0.5	0.8	0.3	0.7	0.5	0.3	0.5	0.6	0.5	0.4	0.6
	G	0.6	0.6	0.8	0.8	0.9	0.5	0.2	0.5	0.5	0.5	0.8	0.6
± m	B	0.4	0.3	0.4	0.13	0.35	0.25	0.15	0.27	0.3	0.26	0.2	0.3
	G	0.33	0.3	0.9	0.42	0.5	0.3	0.16	0.23	0.25	0.27	0.42	0.32

Table 2. – Centile norms of 12 factors of personality peculiarities by the method of R. Cattell in schoolchildren of 7–12 years

Factors of personality peculiarities.		7 years old		8 years old		9 years old		10 years old		11 years old		12 years old	
		B	G	B	G	B	G	B	G	B	G	B	G
«A»	Cyclotomia –Schysotomia	2–6	4–5	2–7	4–8	5–8	4–8	5–9	4–9	5–8	4–7	4–7	3–7
«B»	Intellectual development	2–5	1–5	2–5	1–5	1–6	2–5	1–4	1–5	2–5	2–6	2–6	2–5
«C»	Emotional stableness	4–7	4–7	4–9	4–8	4–7	4–9	3–7	4–8	3–7	4–8	2–7	1–8
«D»	Dominance	2–6	3–4	2–6	3–5	2–6	2–7	2–7	1–4	2–7	2–6	1–7	3–6
«E»	Not caring-calmness.	2–6	1–6	2–7	1–7	1–5	1–4	1–4	1–3	2–6	1–7	1–7	1–7
«F»	Moral concentrations. Behavior.	2–7	2–5	2–7	2–5	3–6	1–4	1–4	1–6	1–5	1–5	2–7	2–5
«G»	Stableness to stress	2–8	2–7	2–7	2–6	2–7	3–6	2–7	3–6	3–6	3–7	4–7	3–7
«H»	Emotional adolescence.	4–5	3–7	4–6	3–8	4–8	4–8	4–7	3–7	3–8	4–7	3–8	2–7
«I»	Intropunitive	3–6	3–6	4–7	3–7	3–7	2–8	4–7	4–7	4–8	5–8	3–7	3–7
«Q»	Self control.	1–6	2–5	2–7	3–6	1–6	3–7	2–6	3–6	2–8	2–7	2–7	4–8
«Q <sub>3</sub> »	Frustrated alarm	2–6	4–6	2–7	4–7	4–8	4–9	2–7	4–9	4–8	4–8	3–7	3–7
«Q <sub>4</sub> »	Flegmative –melancholiteness	2–5	3–6	2–6	3–7	2–8	2–5	2–6	2–8	2–7	2–6	2–7	2–7

The scale "G" shows that a child receives and does the rules and norms of behavior shown by adults. The children that do not accomplish their responsibility have low scores. They don't deserve trust, and it often results in conflicts with parents and teachers. They don't have regularities. They can't concentrate on anything and are lack of stable motivation. High estimation that children have are well developed sense of responsibility, concentration, honesty, accuracy. 7 year old children have much higher sense by this factor. Girls excel boys ( $4.7 \pm 0.15$  and  $5.7 \pm 0.16$ ;  $P < 0.001$  in boys and girls).

High evaluations by factor "I" ( $5.64 \pm 0.3$  and  $5.4 \pm 0.25$  in boys and girls) in children of 7–12 years reflect emotional sensitiveness, rich fantasy, esthetic tendency, dependence, low realistic approach to the solution of the problem, practice.

On the basis of the results of standization of personality peculiarities of schoolchildren, we worked out middle profile type of 12 factors of personality peculiarities by the method of R. Cattell (fig. 1).

The recommended profile of personality peculiarities characterize the peculiarities of personality and actual psychic state of 7–12 year old children. The results of standardization of personality peculiarities of 7–12 year old children, taking into consideration their sex, were given in the table. Relative stableness of the received

standards was established but some differences of some investigated readings were identified depending on the age ( $P < 0.05$ ). The given literature indicates that high readings by the factor "A" characterizes the child as an emotional, sociable, happy person.

As we see from the picture the crooked profiles of the personality are between 3 and 6 wall corridors and it corresponds the literature data. Approach of the datum by the factor "A" corresponds the average profile (in boys and girls 6.0: 4.6), by the factor "Q<sub>3</sub>" ( $5.48:4.6$ ;  $6.1: 4.6$  corresponds to boys and girls), It corresponds the peak of the profile. But the lowest points of the crooked profile by the factors "E" and "F" and the approach of the readings of these factors corresponds the average level ( $3.15: 4.6$  и  $2.8:4.6$  corresponding the boys and girls) shows the tendency. The importance of this datum is rather high in girls than in boys.

There are instructions of interpretation of personality profiles in the literature. They must take into consideration all correspondence of the data and can not be forecasted beforehand as they are interlinked with multiple kinds of individuals.

On the basis of the above mentioned research, age changes were analyzed in two groups: 7–10 years and 11–12 years, sex peculiarities were also taken into consideration (table 3).

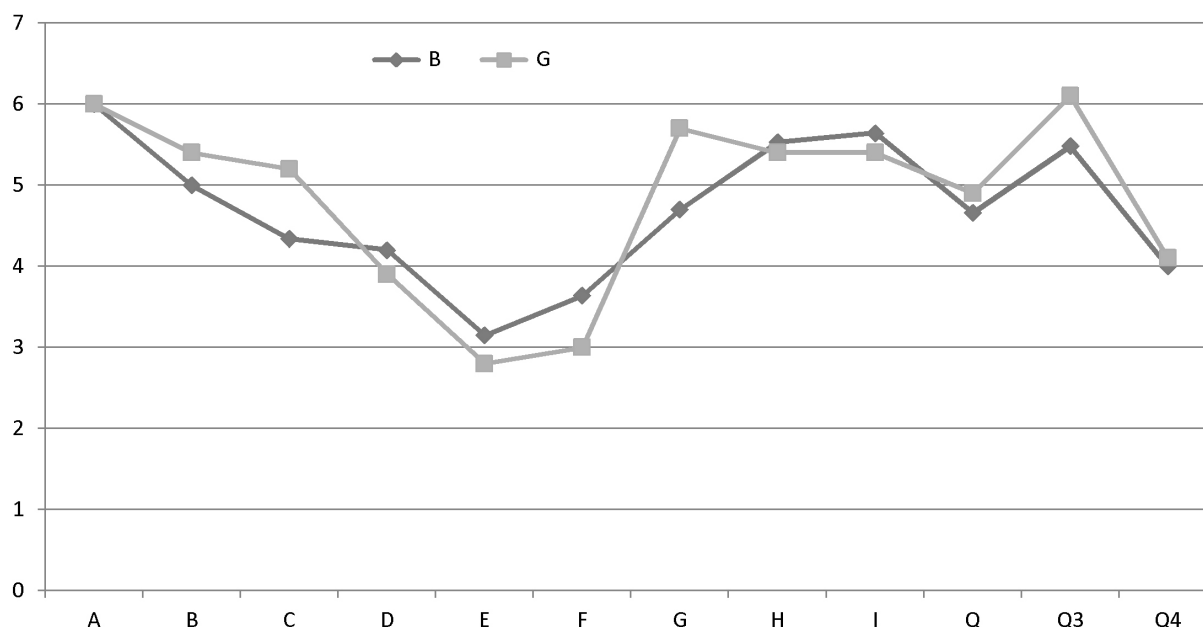


Fig. 1. Middle profile of personality peculiarities of healthy schoolchildren by the method of R. Cattell (7–12 years)

Table 3. – Age peculiarities of individuals of children of 7–10 and 11–12 years

Age, gender	Factors of personality peculiarities (in special units).											
	A	B	C	D	E	F	G	H	I	Q	Q <sub>3</sub>	Q <sub>4</sub>
7–10, boys	6.0±0.23*	3.4±0.51	5.4±0.20	4.0±0.17	3.0±0.2	3.4±0.21	4.5±0.21	5.4±0.21	5.5±0.21	4.5±0.18	5.6±0.23	4.1±0.21
11–12, boys	4.8±0.19	4.2±0.18	5.1±0.19	4.4±0.21	3.6±0.20*	4.0±0.2	5.0±0.17	5.7±0.24	5.5±0.22	5.0±0.22	5.2±0.21	4.9±0.21*
7–10, girls	6.3*±0.19	3.0±0.16	6.0±0.22*	3.6±0.15	2.5±0.17	3.0±0.18	4.6±0.21	5.5±0.18	5.4±0.21	4.6±0.19	6.4±0.22	4.0±0.16
11–12, girls	5.5±0.20	3.8*±0.18	4.0±0.24	4.3±0.21*	3.3±0.26*	3.3±0.21	4.7±0.17	5.2±0.22	5.4±0.18	5.3±0.21*	5.6±0.24	4.5±0.24

Analysis of average importance of factors of ages are the following: with passing the 2 age group the sociableness of children decreases (factor "A"). We know that children's age is characterized by voluntariness, getting interested in others' affairs. This is typical to the norms for children of 7. By forming self-consciousness such

attitude as not being interested with other's affairs gets into being concentrated in themselves, their inner world [2]. This fact is being investigated by us in our.

Factor "B" (intellectual development) has wide meaning for older age group.

This factor reflects formation of such thinking operations as cooperation, separation from general and possession of mathematical operations. As we know at the age of 11–12, a child's concrete thinking changes into abstract-logic thinking [1] and it helps them to solve the sums or tasks easily. There are a number of factors at the age of 10–12 in boys and girls that change their meaning. Positive changes have factors as: "E", "D", "F" and "Q".

We all know at that this very age children become special they differ from other children of other ages by their behavior. The age of 11–12 is considered as a critical age period [3].

Here, the development of a child makes rather a destructive work than constructive. Progressive development of personality of a child switches down and off and stops for some time in the period of crisis. At the early stage the all sides of the behaviour that differentiated the child from others fall and die [3].

Leadership that is peculiar to young age eats itself up and begins to search a new concrete form of activity. Here the hyper activity, overstrain, independence and less accomplishing are born.

By comparing the results that characterize age-sex modifications, we can see that boys are active not only in one group but also in another group. (factor "D"), stubborn (factor "F"),

and overstrained (factor "Q<sub>4</sub>"), have the worst self control (factor "Q<sub>3</sub>")

The factors found with the help of our investigations can be referred to specific peculiarities that differentiate boys from girls in age diapason of 7–12 years. But there are some characteristic differences in investigating factors in children of our region. So, age-sex differences by factors "H", "I", "Q", "G" are minimal. The factor "C" is rather decreased in girls of 11–12 years, they have great sense of obey. These differences by factors have rather a high level of trustworthy ( $P < 0.05-0.001$ ).

So, the data taken by testing determine quality peculiarities of personality in children of 7–10 and 11–12 years. Peculiarities determined from the questionnaire of children's personality form unicum, action and feel of sorry for someone. It enables to speak about the wholeness of individuals.

Our investigations prove that the given method is unique as it gives information about the development of different personality sphere of younger school age. The results of investigations showed that this method reveals age peculiarities of individuals and poses differential abilities. It gives the opportunity to recommend this method for the usage.

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## Possibilities of prediction of recurrent myocardial infarction

**Abstract:** There 131 patients with Q-wave myocardial infarction were observed (mean age  $51.9 \pm 9.13$  year). For all patients were prescribed beta-blockers, ACE inhibitors, statins, aspirin and if needful antiarrhythmics and aldosterone blockators. The observational time was 24 months. During this period recurrent myocardial infarction (RMI) observed in 39 (29.7%) patients. Analysis of the data showed that of the estimated factors most important for prognosis of the RMI counts in acute early postinfarction angina pectoris, arterial hypertension, diabetes Mellitus, as well as the instrumental methods that reflect the functional state of the myocardium: LVMI, and ejection fraction. No less important was the thrombolysis in the first hours of admission, heart rate at rest, estimated at 10–14 days of the disease. In addition, we can not exclude the relationship of RMI and overweight.

**Keywords:** recurrent myocardial infarction, prognostic model, integrated indicator.

According to the WHO in 2005 the incidence of acute myocardial infarction (MI) increased by 32.7% compared with 1997 and amounted to 10.7 million people in the population over 50 years old (Cleland J. G., Coletta A. P. et al. 2005). The frequency of recurrent myocardial infarction (RMI) is 25–29%. RMI seriously worsen the prognosis of disease, causing a cascade of complications (heart failure (HF), arrhythmias, decreased quality of life) as well as a significant effect on mortality [1]. Determination of prognosis of MI is a difficult task because it requires taking into account a large number of interrelated factors that are time-personal prognostic significance [2; 3]. Available in-currently on traditional approaches

to risk assessment are not always perfect, it made difficult adequate choice of tactics of treatment of this category of patients.

**The purpose of research** — an integrated assessment of the risk factors for RMS to enable already at 10–14 days of disease to predict its development during nearest 2 years.

### Materials and Methods

We examined 131 male patients with primary Q-wave MI, aged 30 to 69 years ( $51.9 \pm 9.13$  years).

The hospital phase of AMI treatment was carried out in accordance with the recommendations on the management of patients with MI with ST-segment elevation and included thrombolytic

therapy if indicated, early administration of beta-blockers, antiplatelet agents, anti-coagulants, nitrates, lipid-lowering drugs, ACE inhibitors, loop diuretics.

On 10–14 days in all patients with AMI were performed echocardiography, 24-hours ECG monitoring. To characterize premature ventricular contractile (PVCs) used classification of Lown (1971) and prognostic classification J. Bigger (1982). By-hour qualitative and quantitative assessment was performed correspondingly by PVCs gradations Lown-Wolf: 0-VE absent, 1 rare PVCs; 2 — frequent PVCs; 3 — polymorphic PVCs; 4A — paired PVCs; 4B — PVCs group; 5 — early PVCs. According to the classification J. Bigger after MI to potentially hazardous ventricular arrhythmias (PHVA) refers PVCs > 10 per hour, pair and group PVCs.

There were anterior and posterior localization of MI with the same frequency (59.4% and 40.6% respectively). MI without prior angina history occurs in 42% of patients; 58% had a long history of coronary artery disease. Arterial hypertension (AH) suffered 61.3% of the patients, while only 5.8% of them received regular antihypertensive therapy (beta blockers, ACE inhibitors less often), and were treated episodically.

The factors are likely important for the prediction of complications, initially considered: age, hypertension, diabetes mellitus (DM), the nature of the disease (with previous angina or without); localization, heart rate (HR), defined by echocardiography end-diastolic diameter (EDD), end systolic diameter (ESD) of the left ventricle, left ventricular mass (LVmass), indexed left ventricular mass (LVMi), left ventricular ejection fraction (LV EF), body mass index (BMI).

Follow-up of 2 years. For 2 years RMI observed in 39 (29.7%) patients.

The formulation of predictive scale modification taken probabilistic Bayes — intensive method of valuation indicators [4] with the calculation of prediction index of the normalized intensity and integrated indicators. To compile predictive matrix were obtained comparable figures predicted the phenomenon of gradation of the most important factors. The importance of the factors and their grades were determined using relative risk (relative risk — RR), which is the product of normalized integrated indicator (NII) on the “weight” factor.

### Results and Discussion

Currently, mortality and disability from complications of MI are high, which makes the need to improve the prediction of its complications [5]. Today, there are high-tech methods of prophylaxis, post-infarction complications whether installation cardioverter-defibrillator for the prevention of sudden death or revascularization to prevent RMI. However, taking into account the high-cost of these methods requires more objective and early risk stratification of patients with MI.

To assess the significance of the factors affecting the development of RMI developed scale prediction of risk factors.

As shown by previous studies with increasing age the risk of adverse outcomes in AMI increases [6]. Our findings are consistent with the opinion of other researchers.

Table 2. — The degree of conditionality of the RMI, depending on the relative risk etiologic fraction and the corresponding risk factors

Degree conditioning	RR	EF, %	Factors
Almost full	5.0 <	81–100	
Very high	3.2 – ≤ 5.0	67–80	EPAP; AH;
High	2.0 – ≤ 3.2	51–66	LVMi > 150 g/m <sup>2</sup> ; DM;
Moderate	1.5 – ≤ 2.0	33–50	BMI > 30.0kg/m <sup>2</sup> ; EF < 50%; resting HR > 80 bpm.; Thrombolysis (no); LVDD E/A > 1; LVmass > 200 g.; ESD > 3.5 sm.; SDNN < 100ms.;
Mild	1.0 – ≤ 1.5	Less than 33	age ≥ 45 year; HF FC IV; PVCs > 10/hour; polymorphic PVCs; HRV Ti < 15 s.; EDD > 5.5 sm.; paired PVCs

Analysis of the data showed that of the estimated factors most important for prognosis of the RMI counts in acute early postinfarction angina pectoris (EPAP), AH, diabetes Mellitus, as well as the instrumental methods that reflect the functional state of the myocardium: LVMi, and ejection fraction. No less important was the thrombolysis in the first hours of admission, heart rate at rest, estimated at 10–14 days of the disease. In addition, we can not exclude the relationship of RMI and overweight. These findings are consistent with the opinion of other researchers too [7].

To determine the possible range of values taken on a range of risk factor summarized the minimum and maximum predictor coefficients for each factor. Calculations have shown that the range of risks is within 27.91–61.43. The possible range of risk (27.91–61.43) was divided into three levels: mild (27.91–39.09), moderate — (39.09–50.26) and high — (50.26–61.43), the probability of the risk of RMI. In individuals with high values of the integrated indicator of complex factors studied more likely the risk of the RMI and more prerequisites for inclusion in the group of poor prognosis. Ranking Factors was conducted taking into account the share etiologic factors (Table 1).

Table 1 – Distribution of risk factors in order of importance

Risk Factors	RR	EF, %	Rank place
EPAP	3.77	73.47	1
AH	3.31	69.79	2
LVMi > 150 g/m <sup>2</sup>	3.08	67.53	3
DM	2.93	65.87	4
BMI > 30.0 kg/m <sup>2</sup>	1.99	49.75	5
EF < 50 %	1.93	48.19	6
HR at rest > 80 bpm	1.89	47.09	7
Thrombolysis, no	1.85	45.95	8
LVDD E/A > 1	1.75	42.86	9
LVmass > 200 g.	1.63	38.65	10
ESD > 3.5 sm.	1.54	35.06	11
SDNN > 100 s.	1.51	33.77	12
Age, > 45 year	1.38	27.54	13
HF FC IV	1.35	25.93	14
PVCs > 10/hour	1.26	20.63	15
polymorphic PVCs	1.19	15.97	16
HRV Ti < 15 s.	1.18	15.25	17
EDD > 5.5 sm.	1.11	9.91	18
paired PVCs	1.09	8.26	19

Note: EF — etiological fraction; RR — relative risk.

These relative risk and etiological fraction of risk factors in the development of the RMI indicate that factors almost complete conditioning RMI not identified (Table 3). Very high induced diseases are associated, respectively, with EPAP (RR = 3.77; EF = 73.47%), and GB (RR = 3.31; EF = 69.79%).

The high degree of conditionality of an unfavorable outcome is observed at LVMi > 150 g/m<sup>2</sup> (RR = 3.08; EF = 67.53%) and diabetes (RR = 2.93; EF = 65.87%).

The moderate degree of conditionality of an unfavorable outcome is observed at BMI > 30.0 kg/m<sup>2</sup> (RR = 1.99; EF = 49.75 %); EF < 50 % (RR = 1.93; EF = 48.19 %); resting HR > 80 bpm (RR = 1.89; EF = 47.09 %); Thrombolysis (no) (RR = 1.85; EF = 45.95 %); LVDD E/A > 1; (RR = 1.75; EF = 42.86 %); LVmass > 200 g. (RR = 1.63; EF = 38.65 %); ESD > 3.5 sm.

(RR = 1.54; EF = 35.06 %); SDNN < 100 ms.; (RR = 1.51; EF = 33.77 %).

#### Conclusion:

The most informative in terms of forecasting the development of RMI in patients with Q-MI, is the presence of EPAP, AH, left ventricular hypertrophy, the presence of diabetes and excess body weight.

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## Effect of photodynamic therapy and CO<sub>2</sub> laser in the microbial landscape of purulent wounds in the experiment

### Abstract:

**Objective:** To evaluate the antimicrobial effect of photodynamic complex and CO<sub>2</sub> laser in the treatment of purulent wounds in the experiment.

**Materials and methods.** purulent wound model reproduced in 80 male rats by MP Thick (2002) with some modification. Animals from the third day were divided into 4 groups: 1) 20 rats with physiological regeneration; 2) 20 rats with standard therapy, and 3) 20 rats PDT; 4) rats 20 inclusion complex treatment with conventional methods, the CO<sub>2</sub> laser (JZ- 3A) 3 times daily until the wound cleansing from necrotic raids and PDT. Microbiological studies conducted by the conventional method at the 1<sup>st</sup>, 3<sup>rd</sup>, 7<sup>th</sup> and 10<sup>th</sup> day of the experiment.

**Results.** The discharge from the festering wounds were sown mainly St. Aureus; Proteus mirabilis and E. Colli, polyresistance possess antibiotic. If a high level of contamination of tissue wounds ( $1 \times 10^{6-9}$  CFU/g) was determined prior to treatment the animals of all groups, the carrying out of the integrated laser and PDT contamination was  $10^2-10^5$  cfu/g for 3–7 hours, and the final deadline for all groups It noted a progressive decrease in the level of microbial contamination, especially with PDT and CO<sub>2</sub> laser is below the critical value.

**Conclusions:** Photodynamic therapy in a CO<sub>2</sub> laser complex has a strong antimicrobial activity in the treatment of purulent wounds.

**Keywords:** purulent wounds, microbial contamination, laser, photodynamic therapy.

Modern wound infection manifesting in various forms 35–45 % of the patients surgical hospitals, the problem is not only the clinical but also general biological [1; 5; 7]. Increasing the number of purulent diseases and postoperative complications, a higher incidence of infection and generalization of various types of toxic and allergic reactions, an unsolved problem of purulent infection in surgery. The steady increase in the number of microorganisms that are resistant to commonly used antibiotics, stimulates both the development

and implementation of the health practice of new antibacterial drugs and the improvement of surgical techniques of the local treatment of purulent wounds, including the impact of physical methods [3; 4; 6]. To resolve this issue in recent years successfully used laser photodynamic therapy (PDT) [6; 10; 13]. PDT has recently attracted attention of researchers because of its high efficiency. Antwo antimicrobial photodynamic therapy characterized by a wide specter actions and, unlike antibiotics, practically complete absence



of side effects and the inability of microorganisms to develop resistance to this factor. Its essence is a selective oxidative destruction of pathogenic microorganisms with simultaneous exposure of the photosensitizer (the dye) and the optical radiation with the appropriate wavelength. From the excited state of the photosensitizer generate reactive oxygen species (singlet oxygen), inducing damage various cell structures and death of microbial cells [2; 3; 11; 12].

### Objective

To evaluate the antimicrobial effect of photodynamic complex and CO<sub>2</sub> laser in the treatment of purulent wounds in the experiment.

### Materials and methods

80 white mongrel male rats were used for experimental research. purulent wound model reproduces all rats as recommended by M. P. Tolstoy (2002), with the introduction of a modification [7]. In the pre-depilated and twice treated with antiseptics site skin-femoral gluteal region with a diameter of 2.5 cm was excised skin and subcutaneous tissue to the superficial fascia, crush injuries and underlying muscles region, introduced a 24-hour suspension of the mixture of microbes (museum strains of *Staphylococcus aureus* and *Escherichia coli*), containing in 1 ml. 10<sup>9</sup> microbial cells in a volume of 2 ml. In order to create a seal, to prevent injury and contamination of the surrounding organisms to the edges of the wound stitched plastic ring with a side height of 1.2 cm. and 2.5 cm. in diameter, fixed ring with two sides, inserted into a dry sterile gauze ball and imposed suggestive nodal joints. This 2 rats died of generalized infection. Festering wounds in rats were formed after 48 hours and had all the classic signs of inflammation. Animals from the third day were divided into 4 groups depending on the treatment method: 1<sup>st</sup> group (18 rats) — monitoring the natural course of wound healing; 2<sup>nd</sup> group (20 rats) — the traditional method of treatment (debridement, ceftriaxone, levomekol; 3<sup>rd</sup> group (20 rats) — PDT was performed after removing the gauze ball, and treatment with a solution of hydrogen peroxide with the application of sterile gauze ball moistened with 0.005 % aqueous solution of methylene blue (MS) to the wound surface layer of 1–2 mm., with full closure of the wound surface. Then opaque bandage was applied after 30 min irradiation of installing applications performed FDE-1 (Uzbekistan) with a power density of 200 mW/cm<sup>2</sup>; duration 10 min. on the daily total of 6 treatments [10]. The animals of Group 4 (20 rats) underwent complex treatment including conventional methods of CO<sub>2</sub> laser (JZ-3A) 3 times daily until the wound cleansing from necrotic raids and PDT in the same conditions. To evaluate the antimicrobial action taken tissue samples obtained from a wound and bottom walls at the 1<sup>st</sup>, 3<sup>rd</sup>, 7<sup>th</sup> and 10<sup>th</sup> days after its application.

To assess the effectiveness of the treatment was carried out a thorough dynamic monitoring of the general state of the animals, the local course of the wound process, the progress of wound healing (speed dermal contraction, existence and disappearance of redness around the wound, the rate of formation of primary and secondary scab, the nature of discharge from the wound — its color, smell, quantity). Microbiological studies were carried out by the usual method. Digital material is treated by variational statistics.

### Results and its discussion

When determining overall characteristics of the selected agents it was found that they mainly represented by staphylococci and gram-negative flora. The leading role in microbiological study of discharge from septic wounds took *St. Aureus* (62.5 %);

*Proteus mirabilis* (54.8 %); *E. Colli* (50.8 %) and a small amount *Str. Pyogenus* (12.5 %). It should be noted that the above listed organisms are major pathogens of purulent infection in surgery.

In the study of the sensitivity of microorganisms to antibiotics has been identified to the stability of the most widely used antibiotics. They were susceptible to cephalosporin, fluoroquinolone and aminoglycoside antibiotics last generation, in particular, they were the most sensitive to tsiproflaksatsine, ceftriaxone, and less sensitive to penicillin and erythromycin. In addition, they were multidrug-resistant to several antibiotics at the same time. These results indicate that the microflora isolated from septic wounds, often a MDR.

Together with the high quality microbiological studies we identified CFU, which today are the most informative as possible to determine the level of microbial contamination of the wound per 1 g of tissue. The results of the study showed that before treatment in all groups of animals determined by the high level of contamination of tissue wounds, an average  $1 \times 10^{6-9}$  CFU/g. On the third day simulation of purulent wounds destructive level of microbial contamination was in the animals in Group 1  $10^5-10^9$  CFU/g, the animals of the 2<sup>nd</sup> group receiving standard treatment —  $10^4-10^6$  CFU/g in rats 3 – the second group received treatment only PDT —  $10^3-10^6$  CFU/g, and in the 4<sup>th</sup> animals receiving comprehensive treatment of us was revealed the lowest level of microbial contamination, making  $10^2-10^5$  CFU/g.

On the 7<sup>th</sup> day from the start of treatment of purulent wounds indicators of microbial contamination of the animals in Group 1 were kept at the same level. A significant reduction in microbial load of 1 gram of tissue contact was observed in the animals of group 4 ( $10^2-10^5$  CFU/g), whereas the animals of the 2<sup>nd</sup> and 3<sup>rd</sup> groups averaged  $10^3-10^6$  CFU/g. On the 10<sup>th</sup> day of observation in almost all groups noted a progressive decrease in the level of microbial contamination. However, in the group of animals receiving combined treatment with PDT antibiotic therapy and CO<sub>2</sub> laser was observed sustained reduction in the level of microbial contamination of tissue below the critical wounds.

The results show a strong antimicrobial effect of the proposed method of treatment of purulent-destructive. According to the literature, PDT — is a three-treatment, two component (photosensitizer and light) are exogenous external factors, the third essential component of the It is an endogenous factor — oxygen [9; 10; 11]. When exposed to light of a specific wavelength and photosensitizer energy begins to produce singlet oxygen and other reactive oxygen species that cause oxidative damage to various molecules (proteins, unsaturated fatty acids, nucleic acids), and cell structures (membranes, enzyme systems, genetic apparatus, etc.), that entails inactivation of pathogens [9; 10; 11]. On the other hand, the main target of PDT in vivo conditions in a vascular system, particularly capillary endothelial cells of the [10; 11; 12]. Apparently, the violation of perfusion with hypoxic subsequent necrosis is an important goal of cell death in addition to the direct damage to cellular structures [13; 14].

### Conclusions:

1. Photodynamic therapy in a CO<sub>2</sub> laser complex has a strong antimicrobial activity in the treatment of purulent wounds.
2. Complete the application of PDT and CO<sub>2</sub> laser leads to earlier eradication microbial wound surface, helping to accelerate the purification and healing of purulent wounds.

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## **The effectiveness of individual pregravid preparation at early and late stages of pregnancy in women with hyperandrogenism**

**Abstract:** Individualized complex therapeutic measures conducted for the purpose of correction and prevention of GA TF with in pregravid preparation, reduces the level of active androgens and hemostasis parameters to values close to normal, and reduce the incidence of pregnancy loss.

**Keywords:** Hyperandrogenism, pregnancy, pregravid preparation.

The main task of modern obstetrics is to reduce the number of reproductive losses, and the relevance of miscarriage is not in doubt, since it is the most frequent complication.

The main task of modern obstetrics is to reduce the number of reproductive losses, and the relevance of miscarriage is not in doubt, since it is the most frequent complication. Despite the progress in recent years, advances in the prevention and treatment of this disease, the frequency of NB is stable and high enough. Thus, according to different authors, it is from 2 % to 55 %, reaching 80 % of the first trimester [2; 3]. No degradation of NB frequency points to the difficulties encountered in the management of this group of patients. On the one hand, they are due to multifactorial etiology and pathogenetic mechanisms of disease. On the other — the imperfection of diagnostic methods used and the lack of adequate monitoring of complications arising during pregnancy.

Fetal loss syndrome — a new term that emerged in recent years and includes [4]:

- one or more spontaneous abortions or developing pregnancy on term of 10 weeks or more;
- Stillbirth;
- Neonatal death;

- Three or more spontaneous abortions before 8 weeks of embryonic development.

The aetiology of the syndrome of fetal loss is extremely varied and depends on many factors. Some of them lead directly to abnormal embryo tab, others create unfavorable conditions for its normal development.

The main causes of pregnancy loss: genetic, endocrine disorders, infectious and inflammatory diseases, immunological mechanisms and thrombophilia. By genetic factors often involve embryonic chromosomal abnormalities, which appear as a result of the merger of the two parent cells with point mutations in the chromosome set, arising from a violation of the process of meiosis.

### **Purpose of the study**

To study the efficacy of individualized comprehensive pregravid preparation of patients with hyperandrogenism of various origins in order to reduce the frequency of complications during pregnancy, childbirth and CPR warning.

### **Materials and methods**

The work is based on the results of clinical and hormonal inspection 19 pregnant women aged 21 to 41 years (mean age:  $29 \pm 0.9$  years), including 14 pregnant women from the prospective

study group and 5 patients with non-developing pregnancy from the group of retrospective surveillance.

Inclusion criteria were before pregnancy: clinical signs GA — androgen-dependent dermatopathy (hirsutism, acne, seborrhea, alopecia); laboratory signs of HA with the assessment of androgen metabolites with increased steroid activity (Tobsch > 3.0 nmol/L, TSV > 2.5 pg/ml, androstenedione [An] > 10.0 nmol/L, DHT > 350 pg/ml).

In 9 (51 %) with the GA core group research revealed violations of hemostasis system, including signs of congenital and acquired thrombophilia (TF). Finally, in the study included 19 patients diagnosed with GA: in 16 GA patients was identified before pregnancy, it has been assigned and carried out comprehensive pregravid preparation; in 3 pregnant women with hyperandrogenism NRB was identified for admission to hospital in the early stages of pregnancy and pregravid preparation have not been evaluated.

Efficiency pregravid preparation was assessed by clinical characteristics of pregnancy (especially in the early stages to 10 weeks), as well as the values and dynamics of hormonal parameters in comparison with the group of patients without GA.

Preparing for pregnancy was conducted in women with HA as the first stage of the prevention of complications of pregnancy and the development of NGN.

GA correction performed depending on the origin of the state: the detection of adrenal genesis GA women administered dexamethasone in individually adjusted doses (initial dose — 0.125 mg, or 1/4 tablets); when ovarian genesis of HA administered combined oral contraceptives and the appropriate therapy is insulin resistance (metformin 500 mg/day).

Inclusion criteria were before pregnancy: clinical signs GA — androgen-dependent dermatopathy (hirsutism, acne, seborrhea, alopecia); laboratory signs of HA with the assessment of androgen metabolites with increased steroid activity (Tobsch > 3.0 nmol/L, TSV > 2.5 pg/ml, androstenedione [An] > 10.0 nmol/L, DHT > 350 pg/ml).

Preparing for pregnancy patients with a combination of HA and HF was performed in fertile cycle, taking into account the identified defects of hemostasis and history features. The complex preparation

for pregnancy patients with HA and HF administered vitamin that is activated folic acid (at least 1 mg/day), vitamin E 400 IU, polyunsaturated fatty acids (omega-3). In the presence of hyperhomocysteinemia and MTNRI mutations. C677T carried pathogenetically substantiated therapy include folic acid 5 mg/day (5 mg. folacin), B vitamins Due to the low molecular weight heparins, in most cases used fraxiparine dose of 2850–5700 IU 1 time/day, sc), in doses that depend levels of thrombophilia markers and platelet aggregation activity. Specific methods of investigation include ultrasound and Doppler study, cardiotocography (CTG) in dynamics, ECG, echocardiography.

Hormonal dynamics studies were conducted after detection of pregnancy, or from 5 to week 10 and further 12–13, 15–16, 20–21, 25–26, 30–31, 35–37 weeks of pregnancy. Defines the following hormonal parameters — serum concentrations of progesterone (P), estradiol (E2), estriol (E3), Tobsch, TSV, 17-OH, DHT.

Revealed a history of GA patients with higher burdened menstrual, reproductive and gynecological and somatic medical history indicates a high risk of fetal loss (especially in the early stages) in the current pregnancy. These data confirm the results of other researchers, from which it follows that a greater or lesser degree to 70 % of menstrual disorders, and 75 % of endocrine infertility, and 30 % — of pregnancy loss due to hyperandrogenism.

Note that in our study PCOS was diagnosed in 32.9 % of the women in group I and 41.7 % — in the II group; adrenal and Mixed HA diagnosed in 67.1 and 58.3 % of women, respectively. These data are consistent with results of studies M. Hunter et al. (2000) reported that among patients with PCOS GA frequency of 30–40 %.

#### Conclusions

Patients with hyperandrogenism (HA), have a high risk of reproductive disorders and early fetal loss (up to 1012 a week) are characterized by significantly higher rate in the history of ovarian dysfunction (57.6 % versus 35.3 % in the group of patients without GA), infertility (41.2 % vs. 5.8 %), and the reproductive losses (56.5 % in the HA against 17.7 % in the group without GA).

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## Functional efficiency of myocardial surgical revascularization in patients with unstable angina on the background of diabetes mellitus

**Abstract:** Aim of investigation is to estimate 6 months effect of myocardium surgical revascularization in patients with unstable angina on the background of diabetes mellitus (DM) on central hemodynamics indexes and exercise performance.

34 patients with acute coronary syndrome (ACS) have been included in investigation who were diagnosed coronary heart disease (CHD): unstable angina on the 3<sup>rd</sup> day of observation and there were revealed angiographic indications for surgical revascularization which was performed within 1 month. Patients were randomized into 2 groups subject to presence of background II type DM (group DM+ (18) and DM- (16)).

The carried out investigation showed that in patients with unstable angina and with background of DM and angiographic indications for surgical revascularization there was noted more evident LV dilation of left atrium (LA) in compare with patients without DM. In early post-operative period in patients with background DM significant increase of end diastolic volume (EDV) of LV and systolic function decrease of is temporary noted. By the 6<sup>th</sup> month after surgical revascularization in both groups, in spite of stable keeping of geometrical parameters, significant improvement of LV systolic function and exercise performance is observed. Effect of surgical revascularization on LV systolic function was significantly evident in patients without metabolic abnormalities.

**Keywords:** unstable angina, diabetes mellitus, myocardium surgical revascularization.

### Background

20–25 % of patients with acute coronary syndrome (ACS) have background pathology like diabetes mellitus (DM). In another 40 % disorder of glucose tolerance is noted. “Diabetes and the Heart” investigation in which patients with ACS were observed for glucose tolerance by WHO’s standards estimates a share of patients with ACS and background DM in 45 % [1; 2]. Disturbance of carbohydrate metabolism is associated with mitochondrial deficit and it increases energy deficiency in cardiac hystiocytes and worsens ACS course.

**Aim** — to estimate 6months efficiency of myocardium surgical revascularization in patients with unstable angina on the background of diabetes mellitus (DM) on central hemodynamics indexes and exercise performance.

### Materials and methods

34 patients (23 men and 11 women) admitted to Intensive Cardiology Department of RRCEM with acute coronary syndrome (ACS) have been included in investigation who were diagnosed coronary heart disease (CHD): unstable angina on the 3<sup>rd</sup> day of observation and there were revealed angiographic indications for surgical revascularization which was performed within 1 month.

Patients were randomized into 2 groups subject to presence of background II type DM (group DM+ (18) and DM- (16)). The mean age of the patients was in DM+ group  $61.80 \pm 4.73$  years

and in DM- group  $58.68 \pm 8.33$  years (difference between groups — not significant (ns)).

All patients included into the investigation at primary admission, after 1 week and 6 months after surgical revascularization were performed echocardiography by American society of echocardiography standards. The dynamics of left ventricle end diastolic volume (LV EDV, ml.), anteroposterior size of left atrium (LA, mm.) and left ventricle ejection (LV EF, %) as main index of systolic function have been estimated.

For estimation of exercise performance all patients were performed six-minute walking test (6-MWT). Traveled distance (m.) and reason of stopping (angina pectoris, dyspnea, weakness in the legs) have been estimated.

All received data have been written into summary tables of Excel program, mean figures and their standard errors in the groups were counted. Significance of batch-to-batch variation has been estimated with the use of Student’s T-criterion. Differences of occurrence frequency have been defined with the use of  $\chi^2$  criterion and estimation of its significance subject to freedom degrees by standard nomograms.

### Results and discussion

Groups were comparable by CHD duration ( $4.96 \pm 1.89$  and  $5.35 \pm 1.4$ , years correspondingly), presence of arterial hypertension

(16 and 13 patients correspondingly) and myocardial infarction in anamnesis (in 11 and 10 patients; at average  $2.1 \pm 0.89$  and  $1.24 \pm 0.60$ , correspondingly). Duration from pain starting to admission to hospital in DM+ group was  $9.27 \pm 1.75$  hours DM- group —  $8.42 \pm 2.01$  hours (ns). ST-segment's rise at ECG to admission time has not been noted in any cases. Express-test on T troponin was negative in 100% cases.

All patients within first 24 hours have been performed examination including echocardiography and coronarography and indications for surgical revascularization were revealed. It has been detected that in patients of DM+ group it has been noted more evident ischemic structural-functional re-modeling of heart left chambers (table 1): so, anteroposterior size of LA significantly exceeded the index typical for DM- group ( $p < 0.05$ ), also EDV of LV was higher and LV EF was lower than in patients without metabolic disorders, though significance level of differences by those indexes was not reached. During angiography there were detected 111 hemodynamically significant stenosis: 58 in patients of DM+ group (at average 3.22 stenosis/patient) and 53 in DM- group (at average 3.31 stenosis/patient). Lesion the left coronary artery trunk was noted in 7 patients in DM+ group (38.89%) and in 4 patients in DM- group (25.00%,  $\chi^2 = 0.75$ , ns). All patients were underwent standard treatment for ACS including double antiaggregant, anticoagulative therapy, beta blockers, angiotensin-converting enzyme inhibitors, angiotensin receptors blockers, statins and nitrates, anti-arrhythmics by indications. Patients condition in hospital was stabilized: transformation into IV functional class of angina pectoris has been noted in 4 patients of DM+ group and in 3 ones of DM- group, into III functional class — in 10 and 9 patients and into II — in 4 and 4 patients correspondingly ( $\chi^2 = 0.08$ , ns). 6-MWT performed after stabilizing of condition detected the tendency to reduction of test's distance in patients of DM+ group in compare with patients without metabolic disorders, though differences between groups were not significant. Worse structural-functional condition of cardio-vascular system in patients of DM+ group can be explained by concomitant dysmetabolic cardiopathy followed by mitochondrial energy deficit due to diversion of energy metabolism to sorbitol way [3]. As the result, the function of ATP-dependending calcic pump is reduced, calcic re-setting occurs and myocardium ventricles' rigidity is increased and it leads to disorder of active diastolic relaxation and overload of LA myocardium.

After discharging all patients were recommended to continue standard basic therapy of CHD.

All patients included into investigation, within 1 month after coronary angiography were performed surgical revascularization (3 patients in DM+ group and 2 ones in DM- group in the conditions of cardiopulmonary bypass,  $\chi^2 = 0.11$ , ns). Mammary-coronary bypass grafting have been performed in 2 patients of DM+ group (11.11%) and in 2 cases — in DM- group (12.5%,  $\chi^2 = 0.02$ , ns). Mean duration of surgery was  $316.82 \pm 34.92$  minutes in DM+ group and  $273.26 \pm 10.17$  minutes in DM- group (ns), mean quantity of bypass grafts for one patient —  $3.55 \pm 0.22$  in DM+ group and  $2.97 \pm 0.10$  in DM- group ( $p < 0.05$ ).

1 week after surgical revascularization all patients were performed control examination including echocardiography and 6-MWT. It has been detected that direct effect of surgical revascularization on functional condition of cardio-vascular system was unfavorable: as in patients without metabolic disorders EDV of LV after surgery was increased to 11.90%, LA size — to 10.72%, and LV EF was reduced to 3.31%. But the distance walked in 6-MWT has been increased to 26.52%, in spite of unfavorable changes of

geometry and LV functions. All indicated changes did not reach confidence level. In patients with background DM post-operative dynamics was more evident: increase of EDV was 22.50% (differences with presurgical data —  $p < 0.05$ , differences of relative dynamics of LV EDV between groups DM+ and DM- — ns), as the result, by the 1<sup>st</sup> week after surgical revascularization EDV of LV in patients of DM+ group became significantly higher ( $p < 0.05$ ) than in patients of DM- group. LV EF reduced to 5.00% (significance with presurgical data —  $p < 0.05$ , differences of relative dynamics and absolute value of LV EF by the end of the 1<sup>st</sup> post-operative week between groups — ns). LA diameter increased to 11.46% (differences of absolute values with initial data — ns, with data on the 1<sup>st</sup> post-operative week in DM- group — ns differences of relative dynamics between groups DM+ and DM- — ns). More evident negative dynamics of echocardiography indexes in patients of DM+, is probably connected with dismetabolic cardiomyopathy and more evident post-operative inflammation on the background of mitochondrial deficit [4; 5]. Stated changes has led to negative changes of 6-MWT — reduction of traveled distance to 3.29% has been observed (ns with initial data and with dynamics in DM- group). As the result, by the 1<sup>st</sup> post-operative week, distance of 6-MWT in DM+ group was significantly less ( $p < 0.001$ ) than in the group without metabolic disorders. Standard therapy of CHD has been continued after discharge. The second control examination has been performed at the end of the 6<sup>th</sup> month after surgery. It is revealed that by the 6<sup>th</sup> month after surgical revascularization the sizes of heart left chambers in both clinical groups returned to initial ones (relative dynamics of EDV of LV in patients of DM+ group made up 2.64% with initial data — ns and -14.19% with post-operative values,  $p < 0.001$ , in DM- group -2.52% — ns and -13.65%,  $p < 0.05$ , correspondingly; LA diameter -5.68% — ns, and -12.93%,  $p < 0.01$  and -4.78% — ns and -12.17% —  $p < 0.01$ , correspondingly). At the same time neither absolute values by the 6<sup>th</sup> month of observation nor relative dynamics during the whole time of observation did not differ. But the changes of functional indications — LV EF and 6-MWT were significant: so, LV EF for the whole period of investigation increased in DM+ group to 9.44% and in DM- one — to 11.90% and for the post-operative period — to 15.40% and 19.02% correspondingly (differences of relative dynamics between groups in both periods — ns). Consequently, by the 6<sup>th</sup> month of LV EF observation in both groups significantly exceeded not only post-operative values ( $p < 0.001$  for both groups), but also initial ones ( $p < 0.01$  for both groups). End value of LV EF reached by the end of the 6<sup>th</sup> month of observation in DM- group was significantly ( $p < 0.05$ ) higher than in DM+ group. Also 6-MWT: relative dynamics in DM+ group made up 93.24% with initial data and 112.76% with post-operative ones ( $p < 0.001$  significance of absolute values differences in both groups), in DM- group — 67.99% and 47.39% correspondingly ( $p < 0.001$  for both comparisons, differences of relative dynamics both periods are not significant).

### Conclusion

So, investigation showed that in patients with unstable angina on the background of diabetes mellitus and angiographic indications for surgical revascularization more evident dilatation of LA in compare with patients without DM has been pointed. In early post-operative period in patients with background DM evident increase of LV EDV and reduce of systolic function has been noted. By the 6<sup>th</sup> moth after surgical revascularization in both groups, in spite of stable keeping geometric parameters we have observed significant improvement of LV systolic function and exercise performance. Efficiency of surgical revascularization on LV systolic function was significantly evident in patients without metabolic disorders.

Table 1. – Dynamics of echocardiography and 6-MWT indexes in patients with unstable angina after surgical revascularization subject to background DM (DM+ group is in numerator n= 18; DM– group is in denominator; n= 16)

	<b>LV EDV, ml</b>	<b>LV EF, %</b>	<b>LA, mm</b>	<b>6-MWT, m</b>
initially	<u>144.78 ± 7.89</u> 131.50 ± 8.39	<u>53.33 ± 1.56</u> 56.13 ± 1.74	<u>39.06 ± 1.37</u> 34.75 ± 1.61*	<u>259.00 ± 25.66</u> 308.63 ± 21.35
After CABG	<u>169.89 ± 9.25<sup>^</sup></u> 143.00 ± 5.68*	<u>50.33 ± 1.11<sup>^</sup></u> 53.25 ± 2.10	<u>42.28 ± 1.43</u> 37.88 ± 1.70*	<u>223.33 ± 13.34</u> 357.50 ± 24.76***
6 months	<u>140.06 ± 8.78<sup>###</sup></u> 119.88 ± 5.77#	<u>57.94 ± 1.39<sup>^###</sup></u> 62.19 ± 1.32* <sup>^###</sup>	<u>36.28 ± 1.04<sup>##</sup></u> 32.56 ± 1.15* <sup>##</sup>	<u>433.33 ± 32.69<sup>^###</sup></u> 491.25 ± 16.89 <sup>^###</sup>
<b>Relative dynamics of indexes</b>				
% after CABG	<u>22.50</u> 11.90	<u>-5.00</u> -3.31	<u>11.46</u> 10.72	<u>-3.29</u> 26.52
% 6 months with initial	<u>-2.636</u> -2.521	<u>9.448</u> 11.899	<u>-5.684</u> -4.778	<u>93.240</u> 67.988
% 6 months with CABG	<u>-14.19</u> -13.65	<u>15.40</u> 19.02	<u>-12.93</u> -12.17	<u>112.76</u> 47.39

Note: \* — significance of difference between groups DM+ and DM–; ^ — significance of difference with initial data; # — significance of difference with post-operative data (1 week after surgical revascularization); one sign —  $p < 0.05$ , two signs —  $p < 0.01$ , three signs —  $p < 0.001$

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## Prognosing significance of molecular-biologic methods in antiviral therapy of chronic viral hepatitis C

**Abstract:** Complete the pathological infectious process in chronic viral hepatitis C, leading to cirrhosis and HCC is possible using antiviral therapy. The effectiveness of an antiviral therapy is influenced by various factors and the virus and the body. In this study, we obtained evidence that the genotype of hepatitis C virus genotype and IL-28B gene are independent and reliable factors predictive of SVR.

**Keywords:** Chronic hepatitis C, antiviral therapy for hepatitis C, virus genotype, interleukin-28, genetic predictors.

### Introduction

The actuality of the problem of chronic virus Hepatitis C (HCV) is explained by the high prevalence, the defeat of the most socially active groups in population, high costs and limited effectiveness of treatment, as well as projected in the nearest 20 years with significant increase of patients with cirrhosis and liver cancer [1, 27–36].

To prevent the development of liver cirrhosis and hepatocellular carcinoma also to suspend the progression of the disease allows the eradication of the infectious agent with using antiviral therapy (AVT). It is well known that the low effectiveness of an antiviral

therapy is primarily associated with virus factors as genotype 1, high viral load, the absence of viremia reduction after 4 weeks after the AVT and liver fibrosis [3, 237–244; 5, 1219–1225].

The polymorphism of interferon- $\lambda$ 3 (IFN- $\lambda$ 3) is the most significant genetic factors that influence the effectiveness of the therapy at the patients. In 2009, three independent groups of researchers conducting genome-wide comparison on numerous groups of patients who achieved and not achieved a sustained virologic response (SVR) during AVT have shown that a single nucleotide polymorphism with the IL-28B gene is associated with a high probability of

success in the treatment of [4, 399–401; 6, 63–68]. IL-28B gene encodes recently opened IFN- $\lambda$ 3, allelic variants of polymorphic loci influence the probability of spontaneous elimination of HCV in the acute phase of infection [3, 237–244].

There was identified four single –nucleotide polymorphisms with gene IL-28B, but only three of them shows the effect on SVR in ATV. Nowadays the most studied is the role of the two polymorphic loci: rs12979860 and rs8099917 gene IL-28B in different ethnic groups of patients with Hepatitis C [4, 399–401; 7, 1100–1104]. The molecular mechanism of the association of these polymorphisms with the probability of ATV by the patients during therapy is not installed.

Therefore, the aim of our research is the comparative characteristics of the group patients with chronic hepatitis C with different response to antiviral therapy taking into account the virus factors.

#### Tools and methods

There was examined 128 patients with chronic hepatitis at the age from 16 to 58 years (average age  $35.6 \pm 2.8$ ), 37.6% from them were males and 62.3% were women. Approximate disease duration, defined on the basis of collection of the epidemiological history ranged from 1 year to 10 years (average  $3.8 \pm 1.1$  years). 25.6% cases of patients were unable to specify the epidemiological factors that led to the infection of hepatitis C.

Complex initial evaluation included the traditional set of clinical and biochemical laboratory parameters, USD, study of serological markers (anti-HCV-IgG). The PCR method for determination of RNA-HCV in blood was used at the patients. HCV genotypes (1a, 1b, 2a, 2b, 3a, 4) and the nucleotide polymorphism of IL-28B were determined by PCR technique using specific primers in a human genomic Laboratory Immunology Institute of academy of science of the Rep. of Uzbekistan. The diagnosis was verified on the results of clinical and laboratory data (Health Ministry of the Rep. of Uzb. order number 560 from 30.10.2000).

#### Results and discussion

In the process of study of genotypic features of hepatitis C virus among patients there was revealed at 73.5% cases the genotype 1a or 1b, at 20.6% — 3a genotype and at 5.9% — 2a or 2b genotypes of hepatitis C. High viral load was observed in 88.5% of the patients and moderate viral load was obtained in 11.5% of patients. Severe biochemical activity was observed at 29.6% patients, while 70.4% has showed moderate and the minimum degree of biochemical activity of the pathological process.

According to the of genotyping results gene nucleotide polymorphism IL-28B was exhibited by the follow combinations: locus rs12979860: C/C — 29.4%, C/T — 64.7%, T/T — 5.9%, and the locus rs8099917: T/T — 68.5%, T/G — 31.5%, G/G was not detected. Thus, rs12979860 locus genotype C/T — observed in 64.7% cases, locus rs8099917 genotype T/T was determined at 68.5% cases and considered as the most common genotypes among IL28B investigated patients with HCV.

The next stage of our study was to examine the nucleotide polymorphism of IL-28B in groups of patients with different response to the OEM. Patients with HCV who have completed the course OEMs and observed in the dynamics of the OEM and 6 months after completion of treatment, were conditionally divided into 2 groups: patients with SVR and patients without SVR, i. e. Patients who within 6 months after the completion of the HTP relapsed.

In the study of the distribution of the occurrence of variants of nucleotide polymorphism of IL-28B in compared groups there was determined that in group of patients with SVR rs12979860 locus genotype the most common genotype was C/C, which is found in 71.4% of cases, genotype C/T met in 33.3% of cases, and genotype T/T — 14.3%; rs8099917 locus was the most frequent genotype T/T (in 90.0% of cases), genotype T/G met in 10.0% of cases.

In patients without SVR most frequent genotypes for the two loci were genotype C/T (87.5%) and T/G (62.5% cases) respectively. The difference between these data between compared groups were statistically significant ( $P < 0.05$ ).

In monitoring of haplotypic combinations of loci rs12979860 and rs8099917 in investigated groups, there was noted the predominance of haplotype CC/TT in the group with SVR and the predominance of haplotype CT/TG in the group without SVR.

We have also examined the clinical and virological parameters in comparable groups of the patients. The clinical picture in patients compared groups were observed asthenovegetative (in 84.7% of cases in patients with SVR and in 76.2% of cases in the group of patients without SVR), dyspeptic (3.5% and 6.8%, respectively) and mixed (12.8% and 15.4%, respectively) syndromes. Arthralgic syndrome was observed only in patients without SVR in 3.2 cases. In comparable groups of patients had verified the several degrees of biochemical activity of the organism, moderate and severe biochemical activity was noted in 31.5% of patients with SVR and in 22.6% of patients without SVR. Minimum and low degree of biochemical activity was observed in 68.5% and 77.4%, respectively. As can be seen from the data presented significant difference for the presentation is not marked.

In the study of the genetic characteristics of the hepatitis C virus in two groups there was noted that one genotype were significantly more frequent in the group of patients without SVR (in 76.5% of cases) in comparing with the group of patients with SVR (57.9% of cases) ( $P < 0.05$ ). The genotype 3 was observed significantly more frequently in patients with SVR (32.1% versus 12.6%, respectively) ( $P < 0.05$ ). The genotype 2 in the two groups met in the same rate (9.1% and 11.0%, respectively).

#### Conclusions

The findings indicates to genetic factors including genotype of viral hepatitis C and genotype IL-28B gene which are independent and reliable factors predictive of SVR and conduct a comprehensive survey to determine the patient's genotype. Using of IL28B will take personalized treatment algorithm accordance to standard PVT course which will allow to achieve higher effectiveness of therapy.

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## **Evaluation of women's life quality with genital prolapse before and after surgery**

**Abstract:** Abstract cites the results of evaluation of life quality of reproductive age women with genital prolapse before and after surgical treatment with simultaneous voluntary surgical contraception (VSC).

**Keywords:** genital prolapse, life quality.

### **Introduction**

Under current conditions, considering the tendency to “rejuvenation” of the disease, genital prolapse appears not only medical, but also personal, family, social problem, affecting the sexual, professional, and many other spheres of patients' life, i. e. this pathology affects the quality of patients' life.

In the diagnosis of genital prolapse the main symptom is a detected neoplasm by the patient, which protrudes beyond the vulvar cleft [13; 16; 67; 79; 80]. The most common complaints of patients with genital prolapse are aching and/or feeling of heaviness in the abdomen, whites, foreign body sensation in the vagina, urinary incontinence and gases during exercise, coughing, sneezing, sexual dysfunction. On genital prolapse (GP) sexual life is possible only after reduction of fallen body [149; 157].

It was found that on urinary incontinence life quality loss consists up to 50%, with urgency and mixed — up to 80% [48; 54]. About 37% of US women experience incontinence symptoms, 86% of them noted a significant deterioration in life quality [13]. With the development of new surgical techniques in urogynecology, appears a need of rigorous evaluation of the results of the intervention, so as the development of modern methods of treatment are not always aimed at improving the life quality and reducing the probability of disease recurrence [10]. In this study, the question life quality (LQ) acts as forecast criteria, planned treatment, evaluation of the effectiveness of the treatment, the analysis of early and late rehabilitation.

Assessment of LQ in the surgery is usually performed before and after surgery, which is an important criterion for the effectiveness of surgical intervention [81]. Practically, there are not works dedicated to women life quality section after correction of genital prolapse in conjunction with simultaneous VSC. Due to the development of new surgical techniques is appears a necessary to a strict evaluation of intervention results. Development of new methods of treatment in surgical practice do not always aims to increase survival or decrease the probability of disease recurrence [81, 92, 102]. The level of patients' LQ, established prior to surgery has prognostic value, and helps to provide useful additional information about the patient, allowing a different position to estimate the potential results of the upcoming surgery. As a result, on the basis of risk analysis and the use of a surgical correction the overall treatment strategy for a patient is determined. In the available literature data on the LQ in patients with O and VVPO are fragmentary, due to a small number of studies of this problem, and rather narrow implementation of the proposed questionnaire for the study of LQ in daily practice. A certain negative role in the assessment of the quality of life plays a specificity of some of the issues affecting the intimate side of life

(sexual function). These questions are not acceptable for some patients, especially the older age group [39; 47; 154; 166; 201; 224].

### **Objective**

To evaluate women life quality with genital prolapse before and after surgical intervention.

### **Materials and methods**

The study of quality of life of patients with genital prolapse and simultaneously VSC produced in accordance with the information collected as a result of a questionnaire before and after surgery at 1 year. For comparison was recruited control group of 50 women without prolapsed, similar age composed  $35.2 \pm 3.2$  years (control group).

It was used qualimetric method with application of questionnaire “Short Form 36 Health Quality Survey” (hereinafter — SF-36), which allows to specify eight main indicators of LQ, presented in the form of points, taking into account the fact that a higher score indicates a better quality of life, except pain index. The method recommended by the WHO (1996) to quantify the basic parameters of quality of life (emotional sphere, the sphere of physical, general well-being):

- 1) general health (GH) — assessment of patients health status at the moment of treatment and prospects;
- 2) physical functioning (PF) — reflects the degree to which health limits in the implementation of physical activity (self-care, walking, climbing stairs, carrying heavy loads, etc.);
- 3) role-physical functioning (RFF) — impact on the physical condition of role functioning (work, perform everyday activities);
- 4) role-emotional functioning (REF) — the impact on the emotional state of role functioning, involves assessment of the degree to which emotional state obstructs the work or other daily activities (including an increase in the cost of time, reducing the amount of work done, impairment of quality of its performance and the like);
- 5) social functioning (SF) — social functioning, is defined by the degree to which physical or emotional state limiting social activity (communication);
- 6) pain intensity (PI) — the severity of pain and impact of pain on the ability to engage in daily activities, including work at home and outside the home;
- 7) the viability (V) — means feeling full of strength and energy, or, on the contrary, exhausted;
- 8) mental health (MH) — self-assessment of mental health, which characterizes the mood (the presence of depression, anxiety, an overall positive emotions).

To assess sexual function on genital prolapse was used a PISQ questionnaire (Pelvic organ prolapse/urinary incontinence sexual function questionnaire).



Thus, before the operation the majority of women deliberately tried to limit sex because of GP. This could not affect the overall LQ. The quality of the intimate life of patients is a factor that adversely affects the emotional sphere state. After 1 year of surgical treatment, women often answered confidently to the question of control over urination during intercourse. But their assessment of the sexual life limitations for fear of urine or stool incontinence has not changed practically. Women explained sex limiting by the fear of "disturbing the effect of the surgery". Negative emotions during intimacy diminished significantly. Women marked increase in the frequency of orgasms experienced, driving growth with a sexual partner. There was a trend to an increase in the frequency of sexual desire. All of these changes were accompanied by an increase in satisfaction with sex life. Marked tendency to improve the quality of sex life, talk about the positive effect of removing genital prolapse with simultaneous VSC on women LQ.

### Discussion

The study of LQ was carried out by SF-36 questionnaire, which aimed at determining the status of all areas of LQ, and the PISQ questionnaire, to evaluate the state of sexual activity.

It was found that in all patients observed lower general self-rated health before surgery of GP, regardless of the degree of prolapse. However, the degree of GP effected on LQ self-esteem reducing depth. LQ of patients with a complete prolapse of internal genitals characterized by decrease in most indicators regarding appropriate age control, with the exception of self mental health, social functioning and emotional state influence on the role functioning.

The least, LQ indicators' deterioration were observed in patients with uterine neck elongation. Perhaps, the reason was that the patients were generally younger. This assumption is confirmed by comparison with an appropriate control group for age, which showed no significant differences in LQ.

Already at the age of 45 years partial prolapse differed significantly from the control indicators of general health factors, influence of emotional state to role functioning, social functioning and vitality index.

In patients with elongation other LQ indicators did not differ significantly from the control group. In patients with complete and incomplete GP detected decrease of LQ features more, so than in the group with the elongation, as compared with the control group.

The dependence of the LQ of patients is undoubtedly, but in our study were examined only women of reproductive age. So, Mant (1997), Nguen (2008), Paskulin (2009) pointed, that the age of patients — this is one of the key factors that reduce the patients' LQ.

It is noted, that with the age increasing, in LQ will dominate a sense of psychological comfort. So, LQ is determined by the degree of GP and age [149; 209; 218; 223]. Comparative analysis of the LQ of patients with genital prolapse before and 1 year after surgery showed, that 1 year after the operation appears increase in the level of psychological comfort, women vitality, reduce of pain severity and its impact on women daily activities. Self-assessment of the general state of health after surgery was significantly increased in all women. Reduced LQ indexes, characterizing the physical condition, most likely are associated with limitations of plan recommendation, aimed at preserving the results of surgical treatment. However, when comparing different contraception methods, used after surgery in women found that, in this group compared with the control group, LQ index is characterized by increased physical activity, decrease of role functioning dependence on the physical and emotional condition.

It is noted that GP degree determines the dynamics of some LQ indicators recovery. Pain intensity score changed significantly, in comparison with the preoperative value. Operative treatment of prolapse influenced significant positive impact on the self-esteem of women's mental health.

Surgical removal of GP revealed a significant increase of many LQ indicators' dependence from age, except for role emotional and social functioning. Taking into account the research results before and after surgery, it can be assumed that the severity of the underlying disease and the social position of women (education, position in society and the family, etc.) play a major role in reducing the LQ indexes.

Assessment of LQ indicators, depending on the type of surgical treatment in women with GP before and after surgery demonstrated, that colpoperineolevatoroplastics had a positive influence on the rate of general and mental health. A combination of GP surgery with vaginal tubal occlusion significantly increased almost all indicators of LQ. The operation had a positive effect on the emotional state of role functioning.

We looked at the dependence of LQ change from volume of undergone surgery at 1 year. It was observed significant improvement in all parameters on colpoperineolevatoroplastics and uterine neck amputation with fornix transplantation. Thus, after any GP surgery methods was marked increase in emotional state, self-esteem of viability. This is accompanied by varying degrees of reduction of physical activity level, which, however, may indicate the implementation of doctor's recommendation to restrict the exercise that more impact in the first year after surgery. Looking LQ dependence before and after surgery, depending on the place of residence of surveyed women (city and village), we have not identified significant differences.

One of the components of LQ is a human sexual function. According to the literature, up to 40% of women don't carry out sexually active life because of GP [153; 196; 197; 265; 274; 282]. In our study, many patients did not pay attention to this side of life and feel free to discuss the responses, explaining the peculiarities of education, public views on this side of life in the formative period of their reproductive behavior. Our analysis of sexual function showed that at the time of the survey, most women were married — 67.3% of cases and 32.7% of patients did not have a sexual life because of the widow or her husband's disease. This affected the overall LQ, the state of emotional sphere.

As a positive outcome of GP surgery it should be considered that before the operation 35% of the women pointed the lack of sexual desire sense and after surgery in 74% of women a sense of sexual desire always observed. At the same time, women who have used permanent contraception method, noted satisfaction with sexual life, increase in the frequency of orgasms experienced, driving growth with a sexual partner.

Our research has shown that the removal of the prolapse is not playing fair value in the resumption of sexual activity in women who did not have it before surgery. Women of reproductive age have noted that the cause of discomfort during sexual intercourse disappeared, although «fear of disrupt the effect of surgery» remained for several months. There is a tendency to improve the LQ after surgical treatment of prolapse in combination with VSC, indicating a positive effect removal of genital prolapse in conjunction with a reliable method of contraception on women LQ which is formed by satisfaction in sexual field too. It contributes to the formation of the emotional and psychological evaluation of the LQ of patients and generally has a positive impact on public health indicators [39; 78; 106; 153; 201; 210; 222].

So our work is the first to show the importance of LQ studies in women with GP not only during surgery, but also impact of permanent contraception method on LQ, which does not require additional surgical procedures, and related costs, and also the physical and emotional trauma. In the era of evidence-based medicine using questionnaires for the study of LQ before and after surgery is highly desirable. Since, it will allow estimating the place of different operations in modern obstetrics. In our study, LQ questionnaires allowed to make science-based conclusions on the effect of surgical correction of pelvic organ prolapse with simultaneous VSC on all aspects of patients' life.

Thus, in prolapse and partial GP, as well as the presence of this disease in combination with uterine neck elongation, our proposed methods of surgical treatment with simultaneous VSC are optimal for women of reproductive age, as far as they contribute preservation and restoration of specific functions of female body — menstrual and sexual, which positively affects LQ of these women.

#### Conclusions:

1. LQ in GP depends on the severity of the underlying disease and the social status of women — 42.7% of patients have uterine neck elongation, in which no significant differences were revealed in indexes of LQ compared to the control group.

Deterioration in general health observed regardless of the degree of prolapse. Reliably significant appeared the pain intensity index ( $p < 0.05$ ).

2. The quality of sexual intercourse increased by 83% during performing this method of contraception in women with prolapse of the vaginal walls, reflecting the positive impact of removing genital prolapse with simultaneous VSC on LQ of women. Negative emotions during intimacy diminished significantly. It was observed a tendency to increase the frequency of sexual desire.

3. The effectiveness of surgical treatment, as well as characteristics of the LQ of women after surgical treatment with simultaneous VSC, allows suggesting this method the most efficient in patients of reproductive age. The use of the proposed system of medical measures, including a new method of VSC, can improve the results of surgical treatment and LQ. This system has a significant economic savings in direct medical costs.

#### Recommendations

In women of late reproductive age, suffering from prolapse of the vaginal walls for the prevention of unwanted pregnancies and with the written voluntary informed consent and presence of qualified surgeon-gynecologist, it is recommended to perform VSC with access to fallopian tubes through the front wall of the vagina simultaneously with surgical treatment of the underlying disease.

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## Rectovestibular fistula with normal anus

**Abstract:** The anorectal malformations are presented by wide spectrum of nosological forms. Many aspects of the surgical treatment of the rectogenital fistulas in normally formed anus remain to be debatable because they are described insufficiency in the literature.

**Material and methods.** During the period from 2004 to 2015 in the clinic there were treated 210 girls of the age from one day to 15 years with ARM, of them 17 (8.1 %) girls were with rectovestibular fistula with normal anus (H-type). The patients were examined and underwent the operative treatment by the developed technique.

**Results.** In 4 (23.5 %) patients localization of the malformation was related to the anovestibular type, in 8 (47.1 %) — to rectovestibular — intermediate form, in 5 (29.4 %) — high form of which 2 had rectovaginal fistula. Invaginal extirpation by A. I. Lyonushkin was performed in 3 (17.6 %) patients, fistula liquidation by anterior-sagittal approach — 5 (29.4 %). In 9 (53 %) patients including repeated surgeries in the recurrences were carried out by the technique developed in the clinic.

**Conclusion.** In intermediate forms and lower localizations of the fistulas there were indicated one-step correction, comparatively better results were obtained in liquidation of the fistula with pulling-through of the anterior wall of the rectum. In high (rectovaginal) fistulas this type of operation should be performed after application of the preventive double sigmoidostoma.

**Keywords:** anorectal malformations, H-fistulas, girls, diagnosis, treatment.

### Introduction

Anorectal malformations (ARM) are common congenital abnormalities are a big part Proctologic childhood diseases. The frequency of the ARM in recent years does not tend to decrease and, according to different authors, ranges from 1 in 2000–9000. More frequent fistulous form — up to 90 %. The frequency of certain clinical entities are also different. Boys more frequently rectourethral atresia with fistula, the girls — with rectovestibular fistula [2; 3; 4; 6; 16; 12]. Numerous works are mainly devoted to aspects of diagnosis and surgical treatment of atresia with rectovestibular fistulas in girls. These rare forms a fistula with normal anus formed remain poorly understood. H-type fistula at the ARM first described Bryndorf and Medcen in 1960 (op. Jain P. et al.). The frequency of this type of structure in the anorectal abnormalities, based on different authors, ranged from 2.4 to 3.2 % [1]. According to Le L.I. et al. (2010), generalized the clinical material one clinic, from 1274 patients with ARM 182 (14.29 %) consisted of patients with H-type fistula. Pathology is observed in boys, but less frequently than in girls, is more common among the inhabitants of Asia than in North America and European countries [14].

The choice of surgery for fistula with normal anus formed is not defined. In the publications of different authors stated that the intervention was completed by one of the methods included in the spectrum of operations at the International Congress in Krikenbeke. In most publications, the girls are given preference front anorekto-plastike [9; 14] or transanal access [13]. In the works of individual authors surgeries were performed without preventive colostomy [5; 14]. At low forms most of the authors consider it expedient to surgery without imposing stoma [13], and in cases of rectovaginal fistula — required the formation of colonic fistula. The complication rate — from 5 to 30 %, among them the most frequently observed fistula recurrence. In some observations noted independent recurrent fistula closure. But often held repeated surgical interventions [8; 13].

**The purpose of research** — to analyze the clinical and anatomical features, diagnosis and results of surgical correction of the H-type fistula with normal anus formed for girls based on the clinic.

### Materials and methods

The clinical bases of the Department of Hospital Pediatric Surgery with the course of oncology TashPMI were in 2004–2015, at the examination and treatment of 210 girls aged from 1 day to 15 years from the ARM; of which 17 (8.1 %) consisted of patients with H-type. Distribution of patients according to nosological forms and evaluation of surgical correction of the results carried out in accordance with the International Classification adopted in Krikenbeke, in 2005 [1]. Patients underwent a comprehensive clinical studies to evaluate the anatomical and functional condition of the perineum and sphincter apparatus of the rectum and beam

diagnostic techniques: ultrasound of the internal organs in order to identify co-morbidities; contrast X-ray examination of the rectum; MSCT spine.

### Results and discussion

Analysis of the material showed that the ARM in girls — is a variety of abnormalities, characterized by atresia, contraction or expansion of different length at the level of the distal rectum with fistula sexual or perineum, or presented in the form of bezsvischevych forms or cloaca with large anatomical variations. 4 patients had a combination of various types of anorectal anomaly: in 3 — cloaca with rectal pouch, from one H-type fistula with stenosis of the anus. The age of patients with H-type fistula during surgery corresponded to 3 months. up to 1 year in 7 (41.1 %); from 1 year to 3 years in 2 (11.8 %); 3 to 6 years, 6 (35.3 %); from 7 to 15 in 2 (11.8 %). The reason for the parents of sick children to be served vulvovaginita progression of events and the selection of liquid feces and gas from the vestibule. The amount of discharge of patients was different depending on the diameter and location of the fistulous opening in the lumen of the colon. In broad fistulas constantly observed a noticeable amount of discharge. In a narrow fistula during discharge volume increased during the act of defecation.

The history of all patients observed the phenomenon of urinary tract infection and external genital organs as vulvovaginita. Two girls suffered perianal abscess at the age of 1 and 2 months., On a residence conducted conservative treatment. In 7 (41.2 %) patients had intermittent diarrhea with mucus. In 1 (5.9 %) was observed delay of a chair, in the course of the survey set short anorectal stenosis.

In most cases, the clinical diagnosis was not easy. The main profit for diagnosis inspection of the perineum, external genitalia, and rectum. In 16 (94.1 %) children anus was formed normally, only 1 (5.9 %) marked by the phenomenon of stenosis. In 13 (76.5 %) patients with the typical localization of the anus, in 3 (17.6 %) there was a forward displacement of the anus: in 2 small (index anal position — 0.38), and 1 — a marked (index anal position — 22). In 11 (64.7 %) patients with fistulous diameter more than 5mm was clearly visible place opening of the fistula in the vestibule. In 3 (17.6 %) patients during the fistula with a narrow and 2 (11.8 %) of rectovaginal fistula with pinpoint localization fistula bellied managed using a probe inserted through the mouth of the fistula from the vestibule or in the lumen of the rectum. Thus it is possible to reliably determine the level rektogenitalnogo reports and the final form of the anatomical localization of H-type fistula by A. Holschneider and J. Hutson, 2006 (Fig. 1).

The mouth of the fistula in the rectum lumen was located at different distances from the mucocutaneous transition rectum: to gear lines — 4 (23.5 %), at the level of — 8 (47.1 %), above — 5 (29.4 %). In 4 (23.5 %) of patients corresponded anovestibular localization of H-type — “crotch channel” (Fig. 1a); in 8 (47.1 %) — rec-

tovestubular — an intermediate form (Fig. 1b); one of them in the presence of rectovestibular messages marked as pararectal fistula; 5

(29.4%) — high form, in 2 of them — with a rectovaginal fistula (Fig. 1c).

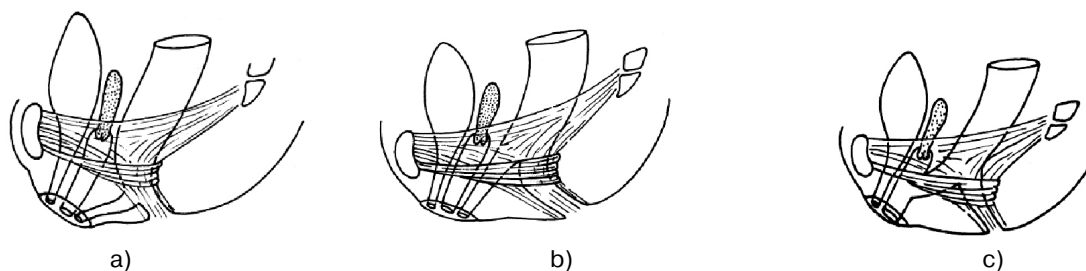


Fig. 1. H-type fistulas in girls

In the study of the function of the obturator apparatus of the rectum in 14 patients (82.4%) patients with the expressed disturbances were observed in 3 (17.6%) showed slight reduction in front pole of the external sphincter.

It is necessary to conduct special research methods to identify associated anomalies of other organs and systems. Ultrasound and CT scan — a study of the spine should be performed in all cases to clarify the often combined spinal abnormalities, urinary tract and cardiovascular system. Associated malformations were observed in 4 patients, two of them — multiple. One — sided ureterohidronefroz, malformation of the spine; in the second agenesis coccyx and dolichosigma.

All patients with H-type rektogenital anastomosis performed surgical correction. 14 (82.4%) children of primary surgery performed in our clinic. 3 (17.6%) were relapsed after surgery invaginative extirpation fistula in other hospitals. In 15 (88.2%) patients initiated radical correction without imposing stoma. In 2 (11.8%) — after the imposition of double-barreled sigmoidostomy: one child of H-type fistula due to severe somatic background, due to anemia; the second child with a rectovaginal fistula. Invaginative extirpation by A. I. Ljonyushkin made 3 (17.6%) patients, the elimination of fistula anterior sagittal access — 5 (29.4%). 9 (53%) patients were reoperations for recurrent conducted by adopting the procedure liquidation of the fistula with bringing down the front wall of the rectum we developed ways to “Surgical correction at intermediate and low sinus forms of anorectal abnormalities in children” (Patent for invention of the Republic of Uzbekistan UZ IAP 04995). Adapted from the method carried out as follows. Fringing cut mobilized fistula hole, slit continues distally in front of the perineum in the middle of the seam to the upper contour of the anus. Next we continue the incision in a crescent along the perimeter of the anus, covering 2/3 of its circumference, leaving intact the posterior pole. Dissection of the perineum muscles, mobilization of fistula and rectum from the surrounding tissue in a distal direction along the side surface of the wire to the mucocutaneous junction. Implemented by the department of the rectum from the posterior vaginal wall and levatornyh muscles in the proximal direction. The length of the mobilization, and relegated resection depends on the localization of the fistula in the rectum. Mobilization of the proximal part of the rectum is achieved around the entire circumference of its relegation to 2–2.5 cm. Subsequently, as you move the front of its walls and floor fixation with the restoration of the integrity of the muscle complex at a distance of 0.7 to 1 cm. is possible to free relegated front body wall outside the ring above the anal rectal fistula hole. Resection relegated anterior rectal wall, bearing the fistula, fistula is conducted

from the top in an oblique direction to the corners of the skin incision wounds to normal after excision of the rectum wall stood at the semilunar skin incision, and fistula — within the excision zone. Rebounding front portion of the external sphincter. By the edges of the crotch crescent wounds on interrupted sutures stitched circle Resected front wall of the rectum. Perineal wound sutured in layers.

The high efficiency of this type of operation when H-type anorectal abnormalities in girls confirmed in publications by other authors. Of the 14 initially operated in our clinic patients, 11 (78.6%) postoperative period was uneventful. In 3 (21.4%) patients had complications. Two were from rectovestibular fistula, one — with a rectovaginal fistula in the presence of rectal fistula recurrence of stenosis occurred. These patients conducted invaginative extirpation fistula (1) and the front anorectoplastik (2).

The results of treatment were studied in 13 (76.5%) of 17 children operated on in a period of 1 year to 5 years after surgery. Treatment efficacy was assessed by objective data on the basis of clinical examination, the appearance of the perineum and performance of functional studies closing apparatus of the rectum. A good result was observed in 10 (77%) — the normal form of the perineum, the absence of the act of defecation disorders. functional studies Parameters closing apparatus of the rectum within the normal or moderately reduced. A satisfactory result in 2 (15.4%) — the normal form of the perineum in the presence of moderate defecation disorders. functional studies Indicators sphincter apparatus of the rectum are reduced. Unsatisfactory results in 1 (7.6%) — deformation of the perineum, the signs of stenosis or insufficiency of the anal sphincter with distinct manifestations of disorders of defecation (persistent constipation). Indicators of functional studies of the sphincter apparatus of the rectum sharply reduced.

#### Conclusions

1. Our observations correlate with the literature on the rarity of the H-type fistula among ARM (8.1%) and the probability of having rectogenital fistula with congenital or acquired origin different localization levels. The presence of an inflammatory component increases the risk of fistula.

2. Diagnosis of low variants of H-type fistula publicly available clinical methods, however, to identify associated anomalies and assessment of the obturator rectum apparatus requires a set of relevant studies.

3. The choice of operation depends on the height of fistula localization. At intermediate and high localization, recurrent fistula preferred intervention, involving the elimination of fistula with bringing down the front wall of the rectum.

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## **Determination of biomechanical characteristics of dentine and dental enamel in vitro**

**Abstract:** Hardness characteristics of the hard tissues of a tooth are widely used in dentistry practice, both in diagnostics and in therapy, they are also very important for individual selection of restoration and other specialized materials. During examination of enamel and dentine hardness, it is very important to handle information that beside its theoretical value also has high practical value. For this purpose, we suggest to calculate hardness of tooth tissue on the basis of quantitative indicator of Vickers microhardness. This method allows to get precise values of hardness characteristics separately for enamels and dentine areas of different localization making a complete picture regarding their biochemical characteristics.

**Keywords:** change, hardness, microhardness, Vickers method, hard tooth tissues, dentine, enamel.

Studying of physical and chemical characteristics of hard tooth tissues has invaluable applied significance for dentistry practice. Specialists examine these characteristics directly during diagnostic testing in order to determine defect or violation of integrity of tooth tissues, identify form of affection, type of clinical progression of a disease and prognosis of its further de-

velopment [1, 92–95]. Of no less value is taking into account biochemical characteristics of hard tooth tissues during treatment process itself in order to choose an adequate therapeutic tactic, tools and special materials required for reconstruction, correction and other types of dentistry treatment. The indicator that is used most frequently for qualitative estimation of biochemical

characteristics of hard tooth tissues and restoration materials is hardness [5, 143–146].

Examination of samples with special devices providing measurement of force and deformation is a common method for determination of hardness characteristics of materials. Sizes of a sample required for performance of these calculations as a rule exceed sizes of a tooth by a factor of 5–10 and more [2, 1198–1201]. In theory it is possible to make testing models from substance and tissues that form tooth, but results obtained will only characterize the hardness of the tooth in whole and not the hardness for each of these substances separately, and first of all the separate harness of dentine and enamel. Theoretical hardness of biomaterials thus calculated considerably differs from actual hardness due to non-uniform distribution of occlusal force in the areas of irregular geometric shape. Besides, in this case there is no possibility to determine biochemical characteristics in areas of transition from enamel to dentine.

Hardness and its ability to resist plastic deformation is one of the indicators characterizing durability of a substance. This quantitative indicator is widely used in dentistry for examination of characteristics of biomaterials [4, 19–26; 6, 383–386].

In view of the abovementioned facts, we suggest to determine hardness characteristics of tooth tissues by measuring their microhardness with following recalculation of obtained values into hardness indicators. Extrinsic value of this method is that it can be carried out without breaking of the test model.

Determination of the principle mechanical characteristics of hard tooth tissues in vitro was the **objective** of this study.

#### Materials and methods

After performing of preliminary studies it was determined that sufficiently complete information about hardness characteristics of a tooth may be obtained by determination of hardness of substances it consists of in points located on lines parallel to long axis of the tooth and line perpendicular to them and nearest located to the occlusal surface of tooth crown. In some cases determination of hardness was carried out in different parallel trajectories [3, 70–72].

Vickers hardness test involves calculating of indicator on the basis of the size of print obtained after pressing of pyramid load with a certain angle into testing material. For fine and miniature details it is possible to measure microhardness.

Distance between separate points where the hardness was measured was taken as 0.22 mm. This pitch size was determined as a minimal one where the results of neighboring measurements, performed via introduction of measuring prism in the material do not mutually affect each other. The selected interval was also chosen due to the resolving power of the method. In our studies it meant that it is impossible to register the hardness changes within this pitch [1, 92–95]. When processing the results the hardness values, deviating abnormally from similar parameters in neighboring points, were excluded and were replaced by mean value for the site. Such deviations were caused by increased calcium content in some zones, size of which was 0.2–0.3 mm. Within the study the described inclusions were considered not significantly affecting the hardness of tooth as a whole.

#### Results

Study of mircoslices of teeth in a number of samples showed the presence of altered dentin in form of ball-like inclusions of irregular shape with diameter to 0.5–0.8 mm of significant density. Also, in the apex part of dental root we noted the increase of dentin hardness. Statistical processing of the data and analysis of diagrams showed that all the samples are characterized by presence of at least two sites, where the harness values differ significantly from each other and conform to enamel and dentin hardness. At the same time the hardness values differ approximately 7–10 times. Some samples are characterized by the presence of sites with significantly increased hardness in the root apex. Length of those local areas was about 1 mm, and established hardness was comparable to enamel hardness. The presence of such sites was typical for the teeth of people older than 50 years. In our opinion, it can be caused by them developing the initial stage of dentin calcification, which, as known, starts from the area maximally close to the blood vessels near the root apex.

Thus, the most typical diagram of changes in hardness, and thus changes in durability of hard tissues of tooth is a stepped line. The largest section with low height of “step” conforms to dentin 500 to 1 000 Vickers hardness units with average value in longitudinal direction  $467 \pm 18.2$ , in transverse direction  $565.8 \pm 32.8$ , which explosively changes to the step of high hardness, conforming to enamel 500 to 4 700, with average value in longitudinal direction 2,  $150.8 \pm 24.8$  and in transverse 3,  $470.2 \pm 17.4$  Vickers hardness units. Results of microhardness measurements were confirmed by the data from microscopic studies [4, 19–26]. This showed clear border of transfer from dentin to enamel without transitional structures. If you compare mechanical properties of substances forming the tooth to the ones of steels used in engineering, you can say, that dentin conforms to the low-grade steel, and enamel — to special wear-resistant coatings of steel details, manufactured as the result of thermal diffusion saturation of surface layer with carbon, nitrogen or cyan salts. The resulting longitudinal and transverse hardness values differ due to specific orientation of enamel and dentin frames in longitudinal direction, caused by specific distribution of chewing load.

Statistical processing showed that the substances forming hard tissues of tooth have expressed individual properties (variability index in our studies was 28.7%). Results of studies of hardness properties of substances forming the tooth, subsequently were used for analysis of distribution of internal forces, which presumes the mandatory knowledge of the values [3, 70–72]. When studying hardness of enamel and dentin on different levels of intact teeth using microradiography we did not detect the significant differences in density values separately for enamel and dentin. However the comparison of the density values for enamel and dentin showed that they differ significantly and this difference is 1.7 times. At the same time analysis of mechanic properties of the materials showed values differing 7–10 times. The resulting data signify that out of those two materials dentin is the main structure, where the stresses from enamel are actively redistributed and neutered in crown and root parts of tooth dentin regardless of its mechanical properties.

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## **Ultrastructure of duodenal ulcers, their micro-collectors at hemorrhages and blood laser irradiation**

**Abstract:** With the help of light and electronic microscopy duodenal ulcers morphology complicated by hemorrhage has been studied. The presence of micro-collectors (MC) and significant quantity of erythrocytes with the prevalence of their pathologic forms (EPF) in ulcers and in periulcerous zones has been shown. Ulcerous hemorrhages promote significant increase of EPF in peripheral blood and decrease of normal erythrocytes — discocytes (D). Intravascular laser irradiation of blood promotes normal ratio of D\EPF. The role of MC in ulcerous hemorrhages development is discussed.

**Keywords:** Ulcerous hemorrhage, micro-collector, erythrocytes, discocytes, intravascular laser irradiation of blood.

Ulcerous hemorrhages (UH) are the most dangerous complications of ulcerous disease. They are observed in 15–20 % patients with ulcerous disease [1; 9; 13].

Conducted morphologic investigations of chronic gastric and duodenal ulcers and peri-ulcerous zones with the use of light, electronic microscopy and special markers have proved an existence of so called micro-collectors (MC). They are the ways of aggression factors (AF) penetration into mucous membrane thickness. It is a basic cause of ulcers occurrence and persisting [11–13].

The concept has been accepted as discovery — «Infiltration of gastric juice occurrence through ulcerous defect in stomach and duodenum wall in patients with ulcerous disease». Priority dated by February, 6, 1991 № OT – 12119.

The role of MC in UH development has not been studied.

US promote significant shifts of discocytes (D) ratio in blood — normal erythrocytes and their pathologic forms (EPF) which is one of the main causes of micro-circulation abnormality.

Intro-vascular blood laser irradiation (IBLI) is widely used in complex treatment of various pathologic diseases [3; 14; 15]. It is the most effective method of erythrocytes forms correction. IBLI is effective at different types of hemorrhages [5–8].

Adoption into practice new generation of apparatus for IBLI allows to impact on blood and other organs by different ranges of waves from 0.36 to 0.9 micrometers and with power from 1 to

35 microwatt. The use of disposable fiberglass conductor with teflon coating allowed to increase significantly an efficiency and mainly to simplify carrying out this not easy procedure and to make it absolutely safe [7; 8].

But investigations of duodenal ulcers at bleeding from them with the presence of micro-collectors and influence on their pathomorphosis and peripheral blood erythrocytes with the use of IBLI, especially with the help of scanning electronic microscopy (SEM), have not been carried out.

### **Object**

To show ultra-structural changes of bleeding ulcers of their micro-collectors and also erythrocytes after complex treatment with the use of IBLI.

### **Materials and methods**

62 cases of bleedings from chronic duodenal ulcers in patients who were treated in RRCEM from 2008 to 2011 have been morphologically investigated. All 62 patients with acute duodenal ulcers hemorrhages have been performed operative interventions. Basic type of surgery at duodenal ulcers hemorrhages, complications at hospital were different ways of stomach resections. It has been performed in 61 (98.3 %) patients. Only in 1 case laparotomy by excision of duodenal ulcer with pyloroplasty by Judd.

For hemorrhage severity estimation we have used subjective data after patient's examination and anamnesis collection, receiv-

ing blood clinical analysis results and objective ones after receiving laboratory data. Hemorrhage severity estimation have been made by A. I. Gorbashko's classification [9]. Traditional medicamental therapy included antiulcer, hemostatic and infusion therapies.

Bleeding ulcers and peri-ulcerous zones biopsy materials and also peripheral blood erythrocytes got from patients' finger have been studied with the help of SEM before and after complex treatment with the use of IBLI (not less 5 sessions). IBLI has been performed with «matrix — IBLI» apparatus, radiation head KL-IBLI,  $\lambda$  — 0.63 micrometer, power at light guide outlet 1.5–2 microwatt, with special needles coated by teflon. The control group was consisted of 15 patients with UH who were underwent hemostatic therapy without IBLI.

Biopsy materials of bleeding ulcers received during diagnostic duodenoscopy before and after complex treatment have been morphologically investigated. Samples of tissues excised from ulcers' borders during operative interventions have also been studied.

Uncomplicated ulcers have been studied with the use of archive specimens of pathologic anatomy laboratory of RSCS named after acad. V. V. Vakhidov.

For light microscopy the tissue has been fixed in 10–12 % formaldehyde solution on phosphatic buffer by Lilly. Paraffin sections have been colored with hematoxylin – eosin.

For transmission electronic microscopy (TEM) tissue samples have been fixed in 2.5 % glutar aldehyde solution on phosphatic or cacodylic buffer, after dehydration in alcohol-acetone have been poured with epon-araldit mixture. Ultrathin sections received at «Ultracut» have been contracted in «Ultrastainer» apparatus and have been looked through in Hitachi H-600 microscope.

Preparations for SEM after above mentioned fixation were underwent dehydration in alcohol-acetone, then were dried out by critical point method in HCP-2 apparatus, were sprayed by gold in IB-2 apparatus and were investigated in JEOL JSM-6010LV and Hitachi-S405 microscopes. For percentage ratio estimation of D/EPF 2 drops of blood from finger is used. Blood is fixed in 1 ml of 2.5 % glutar aldehyde solution on phosphatic buffer.

Erythrocytes forms ratio count has been made at  $10 \times 40$  zoom at selection not less 1000 erythrocytes for each stage and duration of investigation with the use of Biolam-I2 or "Axioscop 40 – ZEISS" microscopes. Light-optic micro-pictures were got by "Axioscop 40 – ZEISS" joined with digital camera and computer with following keeping of data in Pentium-IV with the help of applied programs. Statistic data handlings were underwent by Pentium-IV with the help of BS — Statistica, «Excel – Office» Microsoft- «Windows-Professional» programs.

### Results

SEM showed that there are numerous erythrocytes together with detritus on the surface of bleeding ulcers among which EPF are dominated: echinocytes, stomacytes, erythrocytes with crest and irreversible forms.

Clusters of erythrocytes with EPF prevalence filled wide fissures on ulcers surface, so called micro-collectors (MC) (fig. 1, 2). They are the ways of AF penetration into ulcers thickness and they are structural base of chronization and persistence of ulcers [3].

There is significant decrease of B and increase of EPF in peripheral blood at ulcerous bleeding (UB) (fig. 3, 4).

Medicamental hemostatic therapy led to increase of D share. The use of IBLI in complex treatment of UB promoted more evident normalization of D/EPF ratio. Study of tissue samplings from ulcers borders at UB showed presence of micro-trombus in vessels of different size (fig. 5).

TEM detected the presence of EPF and vascular wall integrity disturbances in vessels lumen (fig. 6). Dominance of EPF in vessels lumen of ulcers borders besides microcirculation's disturbance leads to vessels thrombosis and necrosis occurrence. Direct impact of aggression factors on vessels walls through micro-collectors may be a basic cause of their perforation and hemorrhage development.

Carried out treatment with the use of IBLI promoted evident normalization of D/EPF ratio in peripheral blood (fig. 7).

According to our data, D share in the norm makes 89 %. EPF share in the norm — up to 11 %. D/EPF ratio is 8. At duodenal ulcerous bleedings D share is decreased up to 58 % and EPF share is increased up to 42 %. D/EPF ratio is 1.4 %. IBLI leads to the rise of D share up to 85 % and EPF share is decreased up to 15 %. D/EPF ratio is increased up to 5.7. Free erythrocytes are not defined on the surface of ulcers borders, micro-collectors orifices are got narrow and they become less, erythrocytes do not occur in their lumens (fig. 8).

### Discussion

Morphologic investigations have shown that at introduction of marker (active carbon) into stomach or duodenum lumen 30 minutes before surgery subject to ulcerous disease (complicated or non-complicated) pieces of carbon are determined in micro-collectors lumen [11; 12]. It has been also shown that comparative volumetric share of micro-collectors at bleeding ulcers in compare with non-complicated ones increases in 1.7 times. It is followed by multiple (almost in 7.8 times) increase of comparative volumetric share of blood vessels in ulcers wall and peri-ulcerous zones. Mentioned changes are rated as structural bases of bleedings occurrence [11; 12].

Our investigations have shown that at ulcerous bleedings on ulcers surface, firstly in micro-collectors lumens, erythrocytes quantity is increased, especially their pathologic forms. It is followed by essential increase of EPF in peripheral blood. D/EPF ratio is decreased in 5.7 times [11]. TEM investigation showed that the share of EPF significantly has been increased in vessels lumen and in perivascular areas and ultra-structural manifestations of vessels' walls lesion has been observed. It is known that the form of normal erythrocytes in the shape of biconcave disk allows it, due to deformation, to pass through capillaries diameter of which is less than erythrocyte's diameter, and then to recover its form. EPF lose this capacity and it leads to micro-circulation disorder. Besides, EPF promotes micro-thrombus formation and it is also the cause of micro-circulation disorder [2; 6; 11].

These changes serves as structural base of blood vessels walls integrity disorder and development of capillary bleedings which are the most dangerous ones. Effusing blood from micro-vessels penetrates on ulcer's surface and then into organ's cavity through micro-collectors.

### Conclusions

1. There is an increase of erythrocytes on ulcers' surface and their accumulation in micro-collectors and it points their role in vessels walls lesion and hemorrhage development.
2. Ulcerous bleedings are followed by appearance of micro-thrombus, EPF in vessels lumen and vessels walls integrity disorder.
3. Ulcerous bleedings promote shifts in D/EPF ratio in peripheral blood.
4. IBLI promotes normalization of D/EPF ratio in peripheral blood.



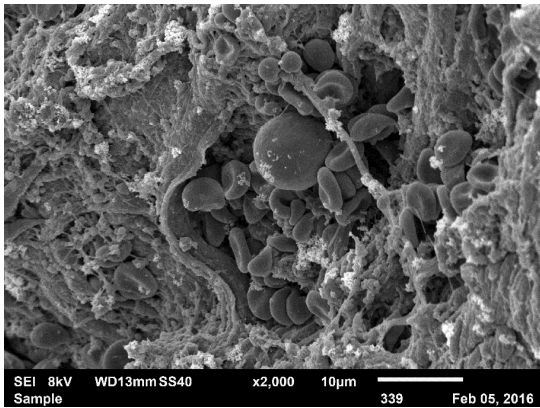


Fig. 1. Dilated orifices of micro-collectors with erythrocytes in the lumen of ulcer's bottom. SEM × 2000

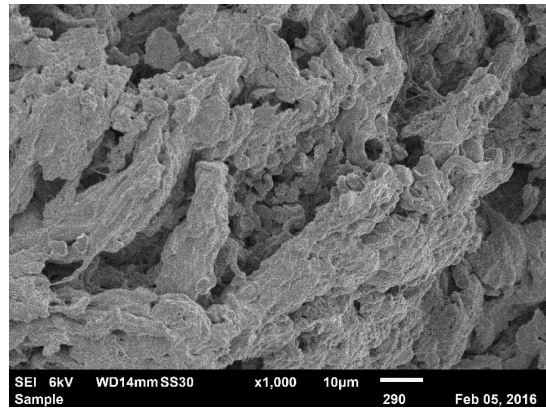


Fig. 2. Micro-collectors between fringe, ulcer's border with erythrocytes in the lumen. SEM × 1000

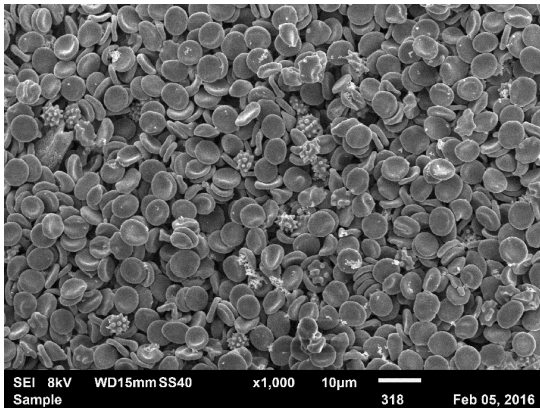


Fig. 3. Erythrocytes pathologic forms dominance in blood at ulcerous hemorrhage. SEM × 1000

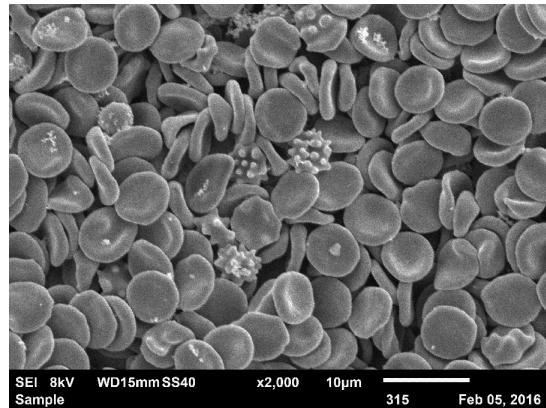


Fig. 4. Erythrocytes pathologic forms in blood at ulcerous hemorrhage. SEM × 2000

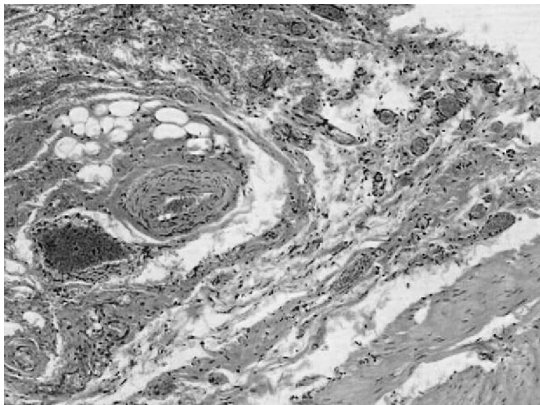


Fig. 5. Erythrocytes pathologic forms in vessel's lumen and around, vessel wall structure's disorder at ulcerous hemorrhage. TEM × 10000

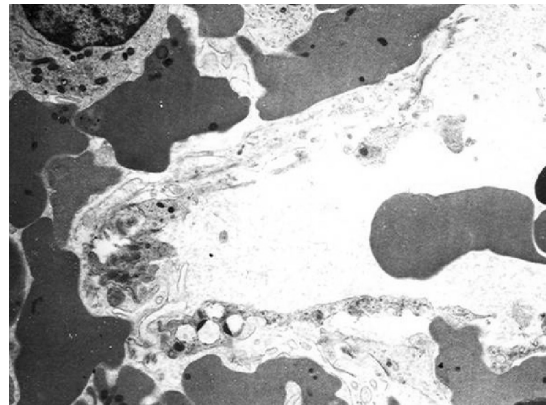


Fig. 6. Micro-thrombus in vessels of different size, ulcer's borders at hemorrhage. H-E 10 × 10

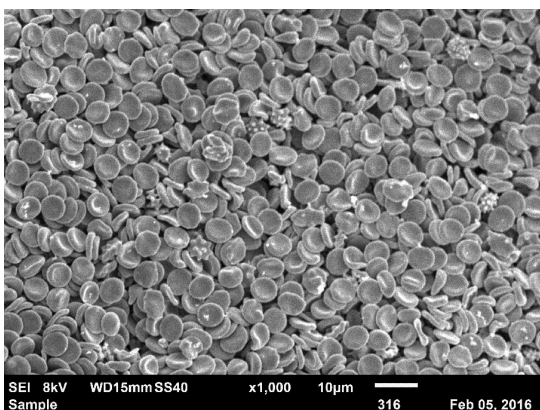


Fig. 7. Blood discocytes dominance after IBLI course. SEM × 1000

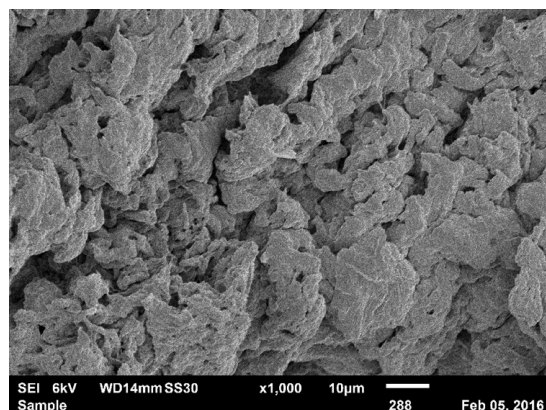


Fig. 8. Decrease of quantity and size of micro-collectors orifices, ulcer's borders after IBLI. SEM × 1000

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## The investigation of biophysical profile of the fetus in pregnant women with herpes infection

**Abstract:** In recent years there has been a tendency to a predominantly asymptomatic flow of herpesvirus diseases. Therefore application of biophysical profiling in fetus condition evaluation, and development of prognostic criteria of perinatal outcomes, with herpes infection can help in differential diagnosis of placental insufficiency prior to childbirth.

**Keywords:** herpes, pregnancy, fetoplacental insufficiency, fetus, placenta.

Currently, there is a significant increase in the population incidence of viral infections, including those of women during pregnancy. Separate delivery of women with herpesvirus infection complicates the postnatal adaptation of the newborns and their state, which suffered during childbirth additional burden by transvaginal infection, with long process of childbirth. The risk of death or serious neurologic consequences among infected infants, given birth by mothers with primary form of genital herpes (HSV2), is estimated to 51 %. The growing role of intrauterine infections among the causes of adverse perinatal outcomes determine the relevance of a comprehensive study of the problem.

**Objective:** The abovementioned defined the following objective of the current study: to develop prognostic criteria of perinatal outcomes, with herpes infection in mother, to reduce perinatal complications and perinatal losses.

### **Materials and methods**

Fetal biophysical profile in 131 pregnant women with a core group of recurrent herpes infection was studied in order to perform

functional fetal assessment. The comparison group consisted of 126 pregnant women with herpes infection in remission, the control group consisted of 60 pregnant women with full-term uncomplicated pregnancy.

In normal and satisfactory BFN study was conducted only once, when doubtful and pathological — doubly at intervals of 24 hours. The study of fetal biophysical profile began by holding a general ultrasound. In all cases the fetal position was longitudinal.

These ultrasound showed the accordance of fetus biometric indicators to gestational age in the main group 72.5%, in the control group 89.3%, and all pregnant women in the control group (Table 1).

Biparietal head size (BHS) of the fetus at 35–38 weeks in the comparison groups averaged  $89.9 \pm 0.07$  mm. The stomach diameter (SD) on the measurement level of the standard section plane averaged  $102.4 \pm 0.73$  mm. Femur length (FL) of the longitudinal section averaged  $68.44 \pm 0.2$  mm. BHS of the fetus at 39–41 weeks in the comparison group averaged  $95.1 \pm 0.2$  mm., SD averaged  $106.3 \pm 0.4$  mm. and FL averaged  $76.63 \pm 0.4$  mm.

Table 1. – Biometrical indices of the fetus

Biometric indicators	I-main group n = 131		II-main group n = 126		Control group n = 60	
	abs.	%	abs.	%	abs.	%
Accordance	95	72.5 ± 3.2	113	89.3 ± 3.5	60	100 ± 1.2
Symmetrical malnutrition	21	15.9 ± 2.8	12	9.3 ± 2.1	–	–
Asymmetric malnutrition	15	11.6 ± 1.3	2	1.4 ± 1.7	–	–

Symmetrical malnutrition of the fetus at term revealed 11 (15.9%) of pregnant women of the main group, 7 (9.3%) pregnant of the comparison group. In symmetrical malnutrition of the fetus at 35–38 weeks — BHS in the main group averaged  $84.5 \pm 1.03$  mm., in the comparison group  $85.2 \pm 2.13$  mm.; FL in the main group averaged  $64.73 \pm 1.03$  mm., and in the comparison group  $65.21 \pm 2.14$  mm., SD in the main group averaged  $87.38 \pm 0.27$  mm., and  $88.71 \pm 0.64$  mm. in the comparison group.

Asymmetrical shape of malnutrition of the fetus at 35–38 weeks was determined 8 (11.6%) in the main group, and 1 (1.4%) in the comparison group. Average BHS was  $88.3 \pm 3.21$  mm. in the main group and  $87.1 \pm 1.14$  mm. in the comparison group; average FL were  $64.8 \pm 1.23$  mm., and  $66.2 \pm 1.84$  mm. accordingly in the groups. Average SD were  $86.21 \pm 0.22$  mm. and  $101.3 \pm 1.04$  mm. in each group consequently.

The placenta thickness measurement in the control group showed no significant change, thus biometrical indices at 35–38 weeks was  $33.67 \pm 0.3$  mm. However, placentography of 47 (68.1%) pregnant women in the main group with biometrical indices averaged  $51.23 \pm 2.04$  mm. and identified signs of placental insufficiency, characterized by a thickening of the placenta edema, the appearance of cysts, calcification sites in the placenta and premature aging of the placenta. Biometrical indices at 39–41 weeks of 22 (31.8%) pregnant in the main group averaged  $23.01 \pm 1.2$  mm., thinning of the placenta and immature placenta signs were observed.

Average rating of the fetus biophysical profile in the main group was  $6.80 \pm 0.31$  points, which is 1.3 times less than that of in the comparison group, and 1.5 times less than that in the control group.

Difference in the tone of the fetus was also determined. So, it was normal in 10 (28.5%) of surveyed in the main group and in 38 (76%) in the comparison group. Moderate decline occurred 2 times more in the main group, and hypotonus occurred 7.8 times more often.

A similar pattern occurred in the evaluation of its motor activity, so almost all fetuses with reduced tone had reduced motor activity.

The surveyed groups were differed by quality and quantity of amniotic fluid. So, on herpes virus infection, oligohydramnios with the inclusion of fine suspension was significantly more often detected in 20 (37.1%) pregnant women of the main group, in 11 (14.7%) of the comparison group, polyhydramnios was found in 27 pregnant women of the main group (39.2%), in 17 (22.7%) of the comparison group and in 2 (3.4%) pregnant women of the control group.

During clinical and functional comparison, it was revealed that these patients had a history of cervicitis, metritis, long treatment for infertility, and threat of present pregnancy interruption.

In structural terms and the degree of placental maturity the surveyed groups were characterized as follows: in the main group of pregnant women detected so-called “immature” the placenta in the main group 32 (46.4%) cases, in 7 (9.4%) in the comparison group that is at a stage of pregnancy 37–38 weeks — the first — second degree of placenta maturity, at term of 34–35 weeks of pregnancy “overripe” placenta was detected with areas of calcification, cystic rebirth in 28 (40.6%) in the main group and 11 (14.7%) in the comparison group. Edematous placenta was detected in 18 (26.1%) of pregnant women in the main group and in 10 (13.4%) in the comparison group. Placental thickness in the main group was  $2.79 \pm 0.07$  cm., and in the comparison group with control group  $3.37 \pm 0.03$  cm. and  $3.51 \pm 0.02$  cm., respectively ( $p < 0.05$ ). Such difference in placental thickness constitutes violation of its function, so as thinning or swelling of the placenta is a predictor of the placental insufficiency development. Our research confirmed the literature data about reduction of placental thickness during placental insufficiency of infectious genesis [2].

Dynamic observation of pregnant women helped to reveal enlargement of the lateral ventricles of the fetus brain. Such pathology was detected in 7 (10.2%) patients of the main group and in 1 (1.4%) of the comparison group.

Pneumatosis of fetal bowel was detected in 23 (33.4%) cases in the main group and 8 (10.7%) in the comparison group. And this pathology in 73.1% cases, combined with oligohydramnios, cloudy amniotic fluid and lowering the tone of the fetus.

Fetal intestinal pneumatosis was detected on 10 (10.7%) of surveyed in the comparison group, though in pregnant women with polyhydramnios and which have borne during this pregnancy recurrent herpes infection.

Thus, for pregnant women infected with herpes virus infection intrauterine infection of the fetus were typical symptoms, corresponding to the presence of chronic long-term current intrauterine infection. Such as: water scarcity and murky amniotic fluid, asymmetric fetal malnutrition, decreased fetal tone and motor activity, as well as the discrepancy degree of maturity of the placenta to gestational age.

CTG method in the study of HCT determined parameters: basal rhythm variability, the presence and nature of the acceleration and decelerations.

As shown by the results of research, reactive (normal) CTG — NST was detected in 38 (50.6%) of the main group and in 58 (96.7%) of the control group. Questionable test — in 38 (55.1%) of the main group, in 29 (38.7%) of the comparison group and in 2 (3.4%) cases in the control group, unresponsiveness in 31 (44.9%) of the main group and in 7 (9.4%) of the comparison group.

Table 2. – CTG data in the research groups

CTG	main group n = 131		comparison group n = 126		control group n = 60	
	abs.	%	abs.	%	abs.	%
Reactive	–	–	64	50.6	58	96.7
Doubtful	72	55.1	49	38.7	2	3.4
Unresponsiveness	59	44.9	12	9.4	–	–

Note: \* — The difference was statistically significant between the I and II group ( $p < 0.001$ ).

Thus, when infected with herpes infection with reliable frequency the signs of intrauterine infection of the fetus was determined, which manifested the presence of symmetric and asymmetric fetal malnutrition, decreased motor activity, and its tone, as well as the presence of abnormal respiratory movements as hiccups shaped. This is often revealed oligohydramnios and lagging degree of maturity of the placenta of gestational age. Suffering intrauterine infection with herpes virus infection was confirmed during the HCT-CTG CTG data showed that the herpes virus infection with recurrent fetal condition suffers much more than the herpes virus infection in remission, which is confirmed by the literature [3; 4; 5].

The results of these studies indicate violations of the fetus state in pregnant women of the first main group. Antenatal fetal hypoxia occurred in almost all cases. The total number of early signs of hypoxia in the surveyed group was observed 2 times more often than that in the comparison group and severe hypoxia was observed 4 times more frequently in the comparison group. Also in the comparison group of surveyed group worsening of antenatal fetal hypoxia in childbirth were detected significantly more frequently. Contractions in childbirth causing a reduction of uterine-placental blood flow and reduced oxygen supply to the fetus. In full-term fetuses without initial antenatal hypoxia there is no pathological reaction to short-term hypoxia-induced vascular spasm during the fight. Infected fetus, considering existing antenatal fetal hypoxia and infection of CNS structures, even short-term decrease in the supply of oxygen at the time of the bout is worsening hypoxia is the cause of perinatal complications. Thus, the data suggest quite informative cardiotocography in assessing the status of the fetus in the III trimester of pregnancy in patients with herpes infection.

The I-main group questionable BFN (6–7 points) was observed in 26 (37.6%) of pregnant. Among them in 26 (37.6%) cases motor activity decrease was diagnosed, in 11 (42.1%) — decrease of reactivity of cardiac activity, in 17 (65.3%) cases, there was oligohydramnios, in 7 (26.9%) observations — a decrease of the respiratory activity of the fetus. Unsatisfactory (pathological) fetal biophysical profile was observed only in the main group in 27 (39.1%) cases. In 100% of the violation of biophysical characteristics except fetal tone was stated. In this group in 16 (23.1%) infants were born in the severe asphyxia. Satisfactory BFN evaluation (8–9) was observed in 18 (26.1%) pregnant. In this group, a decrease points in 38.7% of the cases observed by reducing the amount of amniotic fluid, in 10.8% of pregnant decrease respiratory movements and in 27.8% reduction of motor activity.

In the comparison group, satisfactory BFN (8–9 points) was observed in 41 (54.7%) cases. Reduced points 28 (37.3%) was observed due to low water, in 19 (25.4%) patients by reducing heart rate reactivity, 8 (9.3%) were due to changes in respiratory activity. Doubtful assessment BFN (6–7) score was diagnosed in 17 (22.7%) cases. In this group, a decrease of 22 points (29.3%) cases were observed by reducing the amount of amniotic fluid, in 13 (17.4%) of pregnant decrease respiratory movements. Normal BFN (10–12 points) was observed 17 (22.6%).

From the table above it is clear that the majority of perinatal complications observed in detecting abnormal fetal biophysical profile. Asphyxia and hypoxic-ischemic encephalopathy, severe only occur in pathological assessment of BFN. Hyperexcitability

syndrome with pathological BFN occurs 2.5 times more frequently than in dubious.

In the control group total score BFN was  $10.74 \pm 0.13$ . Normal evaluation of BFN (10–12 points) were 58 (96.7%) of newborns. Satisfactory evaluation BFN (9 points) was diagnosed in 2 (3.4%) cases. The diagnosis of oligohydramnios was not present, but in the determination of fetal biophysical profile in one of the vertical pockets volume of water was less than 2 cm.

In the main group there was no any fetus with normal FFT score of 10–12 points revealed, while unsatisfactory fetal biophysical profile (5–4 points) was observed only in the main group. Questionable score BFN (7–6 points) in the main group met 2.5 times more frequently than in the control group ( $p < 0.001$ ).

Studies have shown that during detection of abnormal fetal biophysical profile in 100% birth by pregnant women with herpes infection relapsing.

Thus, in the main group BFN score of fetus ranged from 5 to 9 points, while the largest group made of pregnant women with doubtful and pathological results of BFN. All infants with abnormal result with 5 points were born in the severe asphyxia, were demanded in resuscitation, treatment in the neonatal period and were transferred to Stage II of nursing.

In the first main group operative delivery was performed in 32 (46.3%), among them in 15 (21.8%) — with an emergency. The main indication for an emergency cesarean section was the aggravation of fetal hypoxia in childbirth, so called fetal distress. These results suggest that in pregnant women with herpes infection in remission stage the fetus is less susceptible to the influence of various pathological factors and its adaptive capabilities better than that in fetuses of pregnant women with herpes infection relapsing.

Performed research shown that in the main group violation of biophysical fetal activity occurred more than in 50% of cases. Newborns of the main group 2.5 times more susceptible to hypoxia and harder tolerates the stress of childbirth. In asphyxia with varying degrees of severity newborns in the main group are born 4–5 times more often than in the control group. Pregnancy with recurrent herpes infection is characterized by an increase in the passage of the frequency of adverse perinatal outcomes, which are exacerbated by the detection of antenatal signs of fetal suffering: (infringement of the biophysical characteristics of the fetus, the symptoms of chronic hypoxia in the CTG-research, abuse of dopplerometric flow indicators).

In identifying dubious and, moreover, the pathological results in the study of fetal BFN it is necessary to predict the adverse condition of the newborn at birth and in a timely manner to resolve the issue of the date and method of delivery.

The results of the biophysical profile of the fetus and its comparison with the state of the newborn at birth and in the early neonatal period shows a high diagnostic value of this method in the evaluation of fetal condition. Thus, biophysical profile of the fetus is an objective criterion of fetal condition evaluation, characterized the severity of the of the fetus state and its compensation stage of placental insufficiency and is a predictor of perinatal outcomes. Also, considering identified differences in research of fetal biophysical profile in the main group and in the comparison group, it is possible to use such method for differential diagnosis of placental insufficiency prior to childbirth.

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## **Application of the injector at implantation IOL RSP-III during phacoemulsification of cataract through a small self-sealing incision**

**Abstract:** Implantation of intraocular lens RSP-III at using the injector at rupture of the posterior capsule during the performance of phacoemulsification cataract allows stable position intraocular lens in the early and relatively distant observation periods, high levels of visual acuity with minimum values of corneal astigmatism.

**Keywords:** phacoemulsification, posterior capsule rupture, implantation of intraocular lens RSP-III through the injector.

### **Relevance**

“The gold standard” of cataract surgery is ultrasound phacoemulsification cataract through a small self-sealing tunnel incision with intracapsular fixation flexible intraocular lens (IOL) [9, 345]. Application of this technology allows to achieve the minimization of injury to the eye structures. The virtual absence of postoperative corneal astigmatism due to the implementation of small self-sealing corneal incision (2.5 mm.), allows to reach high functional results early after surgery. An important factor to achieve the desired result is the initial state structures of the eye. It is obvious that the dominant factor is the safety and strength of the ligaments of the lens unit. According to the literature it is known that at outpatient screening for the level of 5–15 % of patients with cataract are breach of its integrit. According to the classification of N.P. Pashtaev on this group of patients is dominated by the first degree lens subluxation [4, 25–28; 5, 82]. It should be noted that 20% of patients violations ligament of the lens unit is intraoperative finding that ophthalmic already preparing a flexible implant posterior chamber intraocular lens, which represents a considerable risk and it is likely luxcation of intraocular lens into the vitreous body [1, 22–23; 9, 345]. Atypical for phacoemulsification cataract can significantly increase the risk of damage to the capsular bag, provoke loss of the vitreous body, which leads to the abandonment of posterior chamber implantation intraocular lens [4, 25–28; 6, 290–293; 7, 192–195; 8, 100–102]. An this situation, the implantation technique intracapsular rings is most commonly used. Intracapsular rings spreading the capsular bag and creates tension in the areas of defects Zinn ligaments. In spite of this, this method does not solve the problem of weak ligaments, because in the future lysis of ligaments progresses and increases the risk of dislocation of the complex “capsular bag — intraocular lens — intracapsular rings”. All kinds of suturing an intraocular lens or a set of “capsular bag — intraocular lens” to the iris or sclera can lead to hemorrhagic complications.

It must be remembered that in 5–7 years possible eruption of yarn or its biodegradation in the long term, which significantly increases the risk of intraocular lens dislocation into the vitreous body. Equally important is the constant mechanical pressure of the intraocular lens haptics to the ciliary body and the iris, leading to chronic cyclites and impaired hydrodynamics eye [3, 27–29]. Using a variety of techniques or implants pupil anterior chamber intraocular lens model with a wide access (5.0–6.0 mm.) traumatic, increases the possibility of the development of intra- and postoperative complications (vitreous loss, expulsive hemorrhage, endophthalmitis, a high degree of post-operative astigmatism, development of epithelial — endothelialnoy corneal dystrophy, cystic maculopathy), with consequent whole set of problems [2, 9–11]. The postoperative astigmatism is characterized by the fact that the shape and contours of the object are distorted and become fuzzy and uneven, the eyes often hurt, blush, sometimes a burning sensation is felt in eyes. Increased load on the eyes (reading, computer work) can lead to impaired vision — can seeing double, it becomes difficult to determine the distance between the objects. In addition to fatigue the eye, astigmatism can cause constant headaches. Furthermore, during the execution of phacoemulsification 0.05–1.2 % of posterior capsule rupture occurs.

In view of the above, the development of methods of selecting an intraocular lens implantation during cataract phacoemulsification with intraoperative posterior capsule rupture emerged, and in the eyes of the weakness of ligament of the lens unit is relevant, because of its solution depends on improving the quality of functional rehabilitation of patients.

**Objective:** to study the possibility of implantation of intraocular lens RSP-III using the injector during cataract phacoemulsification through a small self-sealing incision.

**Material and methods.** The object of the study were the results of phacoemulsification of 16 patients (16 eyes) with complicated cataract, at intraoperative posterior lens capsule rupture.

Studies of patients carried out on the basis of informed consent in accordance with international ethical requirements (Hel-sinki, 1975).

All patients underwent standard ophthalmic examination: autoceratorefractometers, visometry with and without correction, tonometry on Maklakov or pneumotometry, perimetry, critical flicker fusion frequency, A-scan, B-scan, biomicroscopy, ophthalmoscopy. Status ligament of the lens unit and the degree of reduction of the support function Zinn ligaments were detected indirectly by biomicroscopy and objectively with ultrasound biomicroscopy study.

In carrying out the scientific studies used clinical, mathematical, statistical, and ultrasound biomicroscopy and medical-statistical methods.

Statistical analysis of data from clinical studies carried out by the method of variation statistics using Microsoft Excel software package, including the use of built-in statistical processing functions with the calculation of the arithmetic mean of the studied index (the  $M$ ), SEM ( $m$ ), relative values (frequency, %). Significant differences between the groups studied traits was performed using Student's  $t$  test with the calculation of error probability ( $p$ ). Authentic considered differences in the probability of coincidence of at least  $p < 0.05$ .

Among 9 patients were female (56%) and 7 men (44%), mean age  $73.2 \pm 5.2$  years. By steps of cataract: primary — in 1 eye, immature — 9, mature — 4, overripe — in 2 eyes.

Concomitant ocular pathology: Pseudoexfoliation syndrome II degree — 7 eyes, primary open-angle glaucoma II, III stages — 5 eyes, blunt trauma history — 2 eyes.

According to the ultrasound biomicroscopy 5 eyes marked gap Zinn ligaments in quadrant 1, 4 eyes marked in quadrants 2 and 1 eye was observed gap Zinn ligaments in 3 quadrants.

All patients received standard preoperative preparation, adopted in JSC “Republican Specialized Center of Eye Microsurgery” for patients with complicated cataract.

All patients FEC method “fako chop” Nagahara on our modification using ultrasound in a mode «Burst» (patent number 04320 dated 18.03.2011 the IAP “method of cataract surgery by ultrasound phacoemulsification”, Intellectual Property Agency of the Republic of Uzbekistan) has been performed. To carry out operations using the apparatus for phacoemulsification «INFINITI Vision System» company Alcon (USA) with an ultrasonic tip “NeoSoniH” model, the frequency of the ultrasonic oscillations of the tip of 34–42 kHz. Phacoemulsification of cataract performed by corneal tunnel incision of 2.2 mm. with implantation intraocular lens RSP-III to break the back of the lens capsule. For the prevention of loss of the vitreous at rupture of the posterior capsule was used in all the eyes of cohesive viscoelastic «ProVisc» Alcon (USA).

We have developed a modified method of implantation model intraocular lens RSP-III on own method (a positive decision of the formal examination of the application on 29.04.2015, the number 20150015, published in the Official Gazette number 5 Intellectual Property Agency of the Republic of Uzbekistan). The technique is to implant of intraocular lens model RSP-III through corneal tunnel incision of 2.2 mm. (if necessary, followed by expansion to 2.5 mm.), via the injector into the anterior chamber when the FEC in the posterior capsule intact. Intraocular lens RSP-III centered, haptics are installed in the correct position, and sutured to the iris nylon thread 10–00, departing from its pupillary edge of about 1.5–2.0 mm. in the section of the projection (12 hours). After intraocular lens RSP-III implantation for the prevention of occurrence of pupillary block peripheral iridectomy was performed.

The validity and stability of the intraocular lens RSP-III is the main criterion. Secondary endpoints were: technical difficulties of performing cataract phacoemulsification technique, the presence of intra- and postoperative complications, visual acuity in the early and distant probation periods. Term follow-up of 6 months.

### Results and discussion

Analysis of the results of our studies have shown that visual acuity on the first day after surgery was  $0.4 \pm 0.1$ , on 10<sup>th</sup> after surgery on visual acuity level was  $0.5 \pm 0.1$ . Visual acuity after 1 month was  $0.6 \pm 0.1$ . By the end of the first six months after surgery, visual acuity was  $0.7 \pm 0.1$ .

In all 16 eyes (100%) was achieved the correct position of the intraocular lens in the early (1–3 days) and later periods (6 months) after surgery.

Intraocular pressure for 1–3 hours, and 14 eyes (88%) were within normal limits, 2 eyes (12%) had transient hypertension, which was cupped instillation of antihypertensive drugs and the use of diuretics for 3–5 days. The average value of the intraocular pressure (IOP) was normal in all the observation dates.

Since the implantation of intraocular lens RSP-III was performed using an injector, and did not require an extension of the section, postoperative astigmatism was within the physiological norm.

### Conclusions:

1. Implantation of intraocular lens RSP-III using the injector with posterior capsule rupture during phacoemulsification cataract performing allows stable intraocular lens position in the early and relatively distant observation periods, high levels of visual acuity with minimum values of postoperative corneal astigmatism.
2. The need for a more long-term follow the provisions of the stability of the intraocular lens RSP-III after implantation by the method developed by us.

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## **Study on the composition and concentrations of phosphoglycolipids in the skin of healthy subjects and patients with vitiligo**

**Abstract:** Despite considerable progress recently attained in study on the human skin lipids there is still a number of problems in this area to be solved. As the achievements of our study, the findings on changes in concentrations of total phospholipids and their fractions as well as on cerebrosides in the human skin in vitiligo should be emphasized.

**Keywords:** cerebrosides, fractions, lipids, phosphoglycolipids, skin, vitiligo.

### **Introduction**

The skin is the largest and most visible organ of a human body. It is an outer cover of a human being, a border between the body and the environment. The skin is a live tissue with biochemical and physiological processes proceeding constantly and continuously [1, 11–16]. Human skin has a very complex structure set up of various types of chemical substances. The skin protects a human organism resisting any chemical, physical and microbiological effects [1, 11–16; 2, 3–5]. The mammalian skin consists of definite types of cells bound by a mixture of lipids [2, 3–5].

Various lipids are present both in the skin and in the epidermis. Thus, the epidermis contains nearly equimolar ratios of cholesterol, ceramides and free fatty acids (FFA), the most significant elements to form a well-organized structure of the skin lipid domain [3, 824–834; 4, 10–13]. Quantitative or qualitative changes in lipid composition by sex, age, season, localization and many other factors are of high significance for permeability and dehydration of the skin, as well as for onset and progression of some skin disease [5, 88–91].

It should be noted that some limitations and problems hamper analytical studies on lipids of the skin. Lacking perfect spectrophotometric properties and being more hydrophobic than lipids of other tissues and organs, the lipids of skin is the complex object for analytic study [2, 3–5]. Lipid composition of the mammalian skin was examined quite sufficiently [4, 10–13; 6, 120–130; 7, 147–151; 8, 710–717]; however most studies aimed at determination of limited types of lipids. There is no information about wide spectrum of lipids in human skin, the data about phospholipids and complex skin lipids in pathology are scarce.

Extreme significance of elucidation of role of lipids in the mechanism of the human skin functioning in the normal conditions and in pathology taken into account, wide scale study on fraction composition of lipids from the skin is a crucial task for chemical and medical science. The work was initiated to comparatively study

composition and concentrations of phospholipids and glycolipids in the skin of healthy subjects and in the skin of patients with vitiligo.

### **Materials and methods**

The skin biopsies from healthy subjects and of the depigmented areas from patients with vitiligo were the objects of the study. In total 47 samples of skin were examined, 17 normal and 30 pathological among them. The procedures of extraction of total lipids from the skin and their purification of non-lipid additives was derived from the method of Folch [9, 497–509] with recommendations of Kates [10, 74] by means of chloroform: methanol mixture (2:1 w/w). The total lipid extract of skin thus obtained was used to determine total phospholipids and their fraction composition, as well as for estimation of cerebrosides.

### **Determination of phospholipids and their fractions**

Quantitatively phospholipids and their fractions were assessed by the content of phosphorus determined after mineralization of lipid samples with subsequent colorimetric determination of inorganic phosphorus by reaction of Vaskovsky. SF-26 spectrophotometer (LOMO, the Russian Federation) was used to perform the procedure at 825 nm. [11, 129–141].

Fraction composition of phospholipids was studied by means of thin layer chromatography at KSK silica gel in the mixture of chloroform: methanol: acetic acid: water (16:4:1:14). When the solvent front was achieved, the 13 × 18 cm. chromatographic plates were taken out of the chamber to be dried. Phospholipid fractions were developed in the iodine vapor. Each fraction thus obtained was scraped off, subjected to mineralization with perchloric acid in aluminum blocks at 200 °C. The method of Vaskovsky et al. [11, 129–141] was used to determine inorganic phosphorus thus obtained.

### **Cerebrosides**

Cerebrosides from lipid extract of the skin were obtained by means of a general method for the preparation of cerebrosides by Uzman [12, 149–155]. The procedure involves the extraction of total lipids from fresh tissue with a boiling mixture of chloroform-methanol

and the isolation of the cerebrosides by virtue of their property of accumulating at the interphase zone when dilute trichloroacetic acid is added to the lipid extract. Quantification of cerebrosides was based on determination of galactose, their carbohydrate component. Galactose was determined by method of Radin et al. [13, 789–796] in combination with method of Svennerholm [14, 42–53]. The method is based on reaction of anthrone with cerebrosides diluted in the concentrated  $H_3PO_4$ ; orcinol prepared on the concentrated  $H_2SO_4$  was subsequently added. Intensity of red color thus obtained was measured on Agilent Cary 60 spectrophotometer (Agilent, USA) at 505 nm. The processing of the data was performed by means of Statistica 6.1 program packet [15, 40–49]. Statistical significance was set at P value < 0.05.

## Results and discussion

### Study on phospholipids

Phospholipids are known as amphiphilic lipid molecules comprising a structural basis of membranes and playing a significant role in functional activity of cells and the whole organism. Normal functioning of organs and tissues depends on integrity of membrane phospholipids. Any disorders in the composition and concentrations of membrane phospholipids results in shifts of cell functional activity and initiation of pathological processes.

It should be noted that despite sufficient number of publications on phospholipids of various organs and tissues, the data about human skin phospholipids are practically absent.

We have isolated phospholipids from the healthy subjects' skin to study their total content and fractional composition. The findings from our study demonstrated that the content of total phospholipids in the healthy skin was  $1324.4 \pm 57.9 \mu\text{g}$  of lipid phosphorus per 1 g. of dry tissue or 33.1 mg. of a phospholipid per 1 g. of dry tissue (3.3%). Thin layer chromatography helped identifying 8 fractions, such as lysophosphatidylcholine, sphingomyelin, phosphatidylcholine, phosphatidylserine, phosphatidylinositol, phosphatidylethanolamine, cardiolipin and phosphatidic acid.

Among these fractions phosphatidylcholine makes 37.6% of total skin phospholipids ( $12.45 \pm 0.5 \text{ mg/g}$  of dry tissue) to be

the highest (Table 1). Cardiolipin is the lowest one making 2.2% of total phospholipids ( $0.73 \pm 0.03 \text{ mg/g}$  of dry tissue). Among skin phospholipids lysophosphatidylcholine is in insignificant amounts (3.4% of total phospholipids). Neutral phospholipid fractions, such as phosphatidylcholine, phosphatidylethanolamine and sphingomyelin make 81.2% of total phospholipids, while acidic fractions, such as lysophosphatidylcholine, phosphatidylserine, cardiolipin and phosphatidic acid make 18.8% (Table 1). Mean ratio of the acidic fractions to the neutral ones in a healthy person's skin is 0.23. It should be noted that fractional composition of skin phospholipids does not differ from the one in other organs and tissues of a human organism; however there is difference between the quantitative content of the fractions [16, 28–32; 17, 64–66; 18, 3–6; 19, 54–57].

We examined phospholipid content of the affected skin in patients with vitiligo. Vitiligo is a widely spread human skin disease characterized with white spots on the skin. Today, intensive growth of patients with vitiligo worldwide can be seen; however up to present etiopathogenesis of the disease remained unestablished, and efficient methods for its treatment are absent.

There were no changes in fractional composition of phospholipids in the skin of patients with vitiligo (the same 8 fractions) but the significant changes in the depigmented areas of skin in patients with vitiligo can be seen in quantitative content of both total phospholipids and their fractions. In the affected areas of skin in patients with vitiligo total phospholipids made  $28.9 \pm 1.3 \text{ mg. per 1 g. of dry tissue}$  (2.89%), that is, 15% less than in the healthy persons' skin. Contrary to phospholipids in healthy skin, increase in lysophosphatidylcholine and phosphatidic acid could be seen in the depigmented areas of skin in patients with vitiligo (Table 1). In addition, in the patients increase in phosphatidylserine, phosphatidylinositol and cardiolipin but significant reduction in the neutral phospholipid fractions, such as phosphatidylcholine, phosphatidylethanolamine and sphingomyelin was observed. As it can be seen, phospholipid composition of the skin in patients with vitiligo tends to change significantly.

Table 1. – Phospholipids in the skin of healthy subjects and patients with vitiligo (%)

No.	Phospholipid fractions	Healthy subjects (n = 12)	Patients with vitiligo (n = 32)
1	Lysophosphatidylcholine	$3.4 \pm 0.1$	$5.3 \pm 0.2^*$
2	Sphingomyelin	$20.6 \pm 0.9$	$18.2 \pm 0.8$
3	Phosphatidylcholine	$37.6 \pm 1.5$	$34.2 \pm 1.8$
4	Phosphatidylserine	$3.3 \pm 0.1$	$4.5 \pm 0.2$
5	Phosphatidylinositol	$6.1 \pm 0.3$	$7.9 \pm 0.4$
6	Phosphatidylethanolamine	$23.0 \pm 1.3$	$20.1 \pm 1.2$
7	Cardiolipin	$2.2 \pm 0.1$	$4.6 \pm 0.2^*$
8	Phosphatidic acid	$3.7 \pm 0.1$	$5.2 \pm 0.2^*$

Note: \* — statistically significance difference:  $p < 0.05$ .

### Study on cerebrosides

Cerebrosides or monoglycosylceramides are the essential glycolipids in human and animal tissues playing a significant role in the processes of an organism's life activities. Cerebrosides mostly occur in nervous tissue but can be seen in other tissues in small quantities [20]. Although total content of cerebrosides in tissue cells is not considerable they arouse interest of researchers, and recently have been the object of intensive study. It is firstly due to their strong effect on functional activity of biomembranes. Participating in formation of lamellar bodies of upper skin cover monoglycosylceramides are the significant part of skin lipids and essential barrier of water permeability in the skin [20; 21, 89–95]. It should be emphasized that the role and place of cerebrosides in the life activities of organs

and tissues, and in all human organism remain slightly explored. Participation of cerebrosides in the onset and progression of pathologies has been practically unexplored; their role in pathogenesis of many human disorders, vitiligo included, remains unclear. We have managed to study the content of cerebrosides in the skin of healthy subjects and patients with vitiligo; the depigmented areas of skin of the patients were examined.

The findings from our study demonstrated that mean quantitative content of cerebrosides is  $283.5 \pm 15.7 \mu\text{g/1g}$  of dry tissue. Cerebrosides have been found to decrease in depigmented areas of skin in patients with vitiligo making  $245.2 \pm 14.1 \mu\text{g/g}$  of tissue in the average reducing by more than 13.5%. The findings are the evidence for the fact that cerebrosides can play a significant role in



pathological processes taking place in a human's skin. Thus, in our study both qualitative and quantitative assessment of a human's skin phospholipids and their fractions, as well as these of cerebrosides has been performed. The data can be considered as an advance in study on a human's skin chemical composition considerably improving our knowledge about its lipid composition.

In earlier studies on skin lipids free fatty acids, ceramides and cholesterol were stated to be essential lipid components of a human's skin occurring in approximately equimolar ratios [6, 120–130]. According to Pappinen et al. [3, 824–834], in human skin there is 27%, 51% and 21% of cholesterol, cerebrosides and FFA, respectively. These authors demonstrated that the stratum corneum contains 15.1% of lipids per dry tissue weight; level of phospholipids was 0.4% only. This is significantly lower than in our study. In other studies phospholipids make 9% of a human's epidermis [22, 55–56]. As it can be seen, according to various authors, quantitative content of a human's skin total lipids, including phospholipids, significantly differs. In our study we have managed to establish that phospholipids in a healthy human's skin make 3.3% of dry tissue weight.

There were some studies demonstrating changes in skin lipids upon pathology. Bouwstra and Gooris [4, 10–13] reported that

ceramides decreased in the skin of patients with psoriasis, FFA in stratum corneum were found to increase in the ichthyotic skin. In our study we have managed to demonstrate decrease in monoglycosylceramides (by 13.5%) in the affected areas of skin in patients with vitiligo.

#### Conclusion

Despite considerable progress recently attained in study on a human's skin lipids there are still a number of problems in this area to be solved. First, no robust information about all classes of lipids is available; second, the information about qualitative assessment and function is debatable; third, there are no data about lipid composition of a human's skin lipids upon skin diseases. In a way, the findings from our study fill the gap. Phospholipid composition and their fractional content in the human skin have been established. We have managed to determine the content of monoglycosylceramides (cerebrosides) in the human skin. As the achievements, the findings on changes in concentrations of total phospholipids and their fractions as well as on cerebrosides in the human skin in vitiligo should be emphasized. All-sided study on other representatives of the human skin lipids is needed to be conducted.

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## Rehabilitation treatment of patients with neovascular glaucoma

**Abstract:** An algorithm for the rehabilitation treatment of patients with neovascular glaucoma.

**Keywords:** neovascular glaucoma, antiglaucomatous operation.

Because byway pathogenesis of neovascular glaucoma (NVG) treatment of this prognostically unfavorable disease remains a serious problem in ophthalmology. The most frequent causes of neovascular glaucoma is retinal vascular lesions, such as proliferative diabetic retinopathy and retinal vein occlusion of the central or branch, as reasons for neovascular glaucoma may be inflammatory eye disease, trauma, retinal detachment. Pathognomonic symptom of neovascular glaucoma is the presence of newly formed blood vessels on the iris [4, 357]. One of the leading units in the pathogenesis of neovascular glaucoma is a chronic hypoxia of the retina, leading to the development of iris neovascularization. This progression of neovascularization of the iris creates especially difficult conditions for the normalization of IOP, leading to instability of the postoperative IOP reduction. However, underlying disease, which develops as a result of the disease process, largely determines the specificity and resistance to the disease to standard drug therapy. In addition, neovascularization of the iris and anterior chamber angle is a high risk factor for intraoperative and postoperative hemorrhage, which complicates surgery for glaucoma [3, 114]. This pathology is characterized by severe scarring process in the area of surgery, leading to a recurrence of elevated intraocular pressure. All this greatly complicates the treatment and makes the prognosis of neovascular glaucoma is extremely unfavorable [1, 10].

NVG treatment includes conservative, laser and surgical techniques [5]. According to the literature, at all stages of NVG shows intravitreal therapy, which comprises administering drugs angiogenesis inhibitors. Intravitreal injection of the drug leads to regression of vessels. The reduction or disappearance of the newly formed blood vessels after injection of angiogenesis inhibitors allows for operation with a lower risk of hemorrhagic complications. Using modifications fistulizing operations, the establishment of new operations, the use during glaucoma surgery antiproliferative drugs and modern models of shunting devices increases the efficiency of the treatment, patients with NVG [6, 214–220]. However, any of the methods inherent complications, which limit their use and require in each case specific balanced approach in the selection of the optimum tactics of the patient [7, 298–302]. The problem of choosing the method of NVG treatment depending on the results of a complex examination of patients in the literature covered enough. This makes the relevance of the application of optimization methods for the treatment of patients with NVG-based treatment algorithm taking into account the stage of the disease, and the objectification of evaluation of examination and treatment of patients. Low efficiency of traditional medical and surgical treatments, a high percentage of post-operative complications make the treatment of neovascular glaucoma problem one of the most important problems in modern ophthalmology. In this regard, the development of the tactics of rehabilitation in patients with neovascular glaucoma is a timely and well-founded.

### **Purpose of the study**

Optimization of rehabilitation of patients with NVG by applying rehabilitation treatment algorithm.

### **Material and Methods**

In Joint Stock Company “Republican Specialized Center of Eye Microsurgery” developed and put into practice the methods of complex diagnostics and treatment of patients with NVG, the indications and contraindications for surgical, laser and conservative treatment of disease. Studies of patients carried out on the basis of informed consent in accordance with international ethical requirements of the WHO (Helsinki, 1975). Based on the innovative methods we were treated 60 patients with neovascular glaucoma, applied to Joint Stock Company “Republican Specialized Center of Eye Microsurgery” from 2009–2015. Mean follow-up of patients was 24 months. Of the patients examined 24 were men (40%), women — 36 (60%). The average age of patients was  $60.7 \pm 1.9$  years.

To ensure the prevention of operational and postoperative complications of patients was found out the existence of cardiovascular, immunological, inflammatory and other bodily changes such as hypertension, atherosclerosis, diabetes, varicose veins, thrombophlebitis, blood disorders, vasculitis, uveitis, surgeries, acute disorders stroke, acute myocardial infarction, and others.

All patients underwent clinical examination, includes laboratory diagnostics, counseling therapist, otolaryngologist, dentist, according to testimony consulted an endocrinologist, cardiologist, neurologist. Further examination: molecular-genetic typing of the factors of the hemostatic system — analysis of polymorphic alleles G1691A FV–Leiden, G20210A, prothrombin, C677T-MTHFR, consulting hematologist (by prescription), medical consultation genetics (if indicated), Doppler of the brain blood vessels and the neck (on indications).

The cause of NVG in 30 (50%) cases is diabetic retinopathy, in 24 (40%) cases — postthrombotic retinopathy, the cause could not be detected in the remaining patients NVG. Longevity disease diabetes from 3 to 12 years. Diabetes type I — 10 (33%), diabetes type II — 20 (67%). Patients with post-thrombotic retinopathy term appearance of NVG amounted to 3–6 months after retinal vascular thrombosis. The cause of thrombosis were hypertension history. Among the examined patients with NVG, according to the classification M. Shields [8, 269–286], II stage was recorded of 13 patients, accounting for 16%, III stage — 26 patients (33%), IV stage — 41 (51%).

Eye diagnosis included a visometry, perimetry, tonometry, tonography, biomicroscopy, gonioscopy, ophthalmoscopy, ultrasound A-, B-scan, ultrasound biomicroscopy, optical coherence tomography (if transparent eye fluids), fluorescent retinal angiography (if indicated).

In carrying out the scientific studies used clinical, mathematical, statistical, and ultrasound biomicroscopy and medical-statistical methods.

For the medical-statistical analysis of the results of treatment of patients used the technique of selection of the data, which were recorded in a thematic map we developed examination of the patient with neovascular glaucoma.

Statistical analysis of data from clinical studies carried out by the method of variation statistics using Microsoft Excel software package, including the use of built-in statistical processing functions with the calculation of the arithmetic mean of the studied index (the M), SEM (m), relative values (frequency, %). Significant differences between the groups studied traits was performed using Student's t test with the calculation of error probability (p). Authentic considered differences in the probability of coincidence of at least  $p < 0.05$ .

Based on our analysis and diagnosis of patients with neovascular glaucoma, we have developed a computer program for the rehabilitation treatment of patients with neovascular glaucoma [2] reg. Number DGU 02641, issued by the Agency for Intellectual Property of Uzbekistan in 2012. Programming Language — Delphi 7, the

operating environment — Microsoft Windows XP and later. The program consists of 6 modules. Rehabilitation treatment algorithm of patients with NVG is shown in Fig. 1.

The purpose of this innovative method is to make the computer functional state of the patient data with neovascular glaucoma, taking into account characteristics of the course and stage of the disease to determine the indications for conservative, laser, surgical treatment of neovascular glaucoma, which allows for the reduction of intraocular pressure and stabilization of visual function.

**Results and discussion**

NVG treatment involves, first of all, correction and treatment of common diseases, ophthalmological treatment includes conservative, laser and surgical techniques NVG, drug therapy: ineffective at all stages.

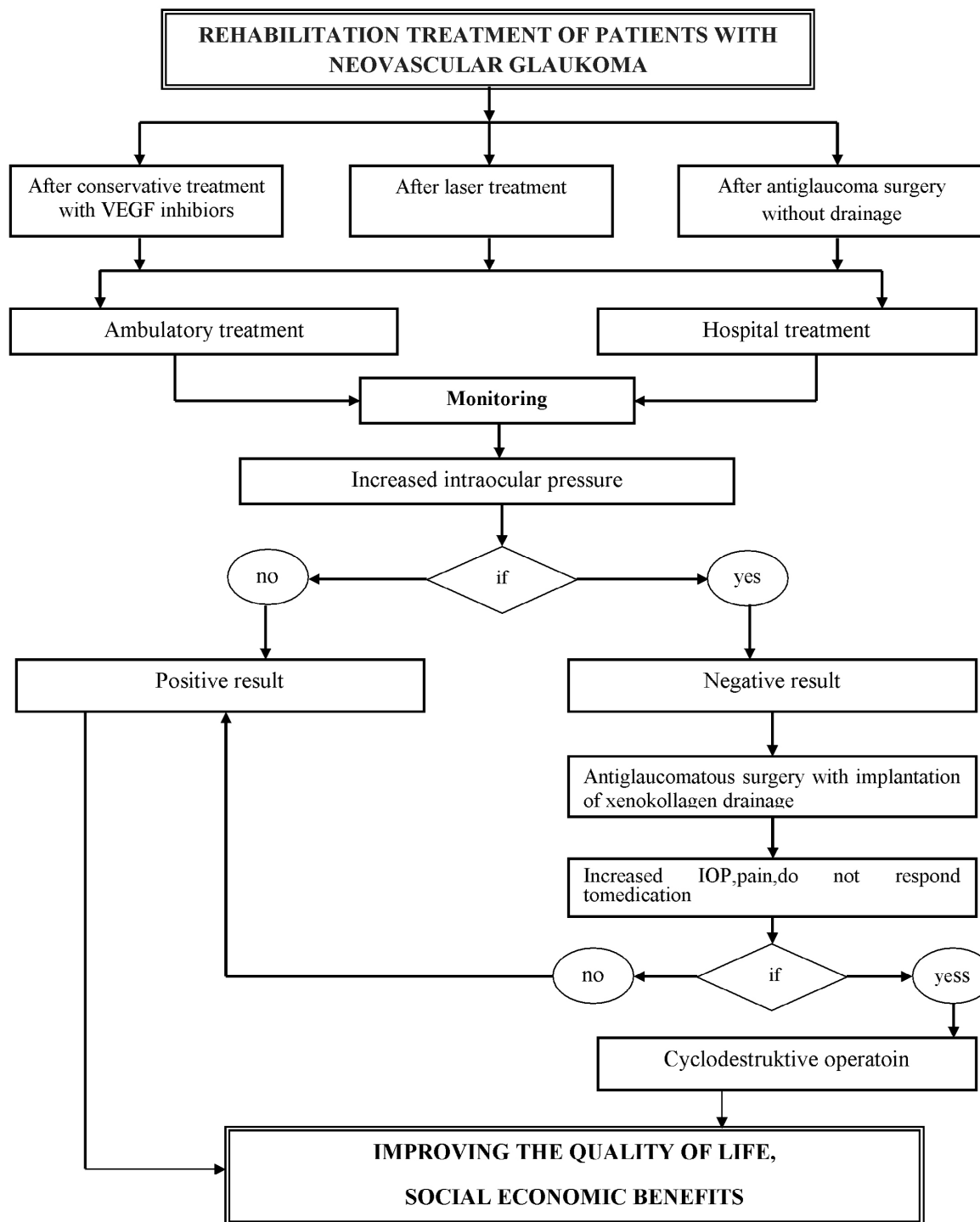


Fig. 1. Algorithm rehabilitation treatment of patients with NVG

The appearance of effective anti-angiogenic agents such as monoclonal antibodies against vascular endothelial growth factor (VEGF) has made possible a direct effect on growth of abnormal blood vessels in the anterior segment. After ocular administration of these drugs is very rapid disappearance of the newly formed blood vessels visible iris and angle of the anterior chamber. This avoids the serious complications of cataract surgery and glaucoma patients with NVG.

To reduce IOP recommended to use  $\beta$  — blockers and carbonic anhydrase inhibitors which reduce intraocular pressure but not enough to efficiently. In the case of severe pain syndrome is recommended to use atropine, corticosteroids and diuretic drugs, which have a temporary analgesic and hypotensive effects are only effective as a preparatory stage for surgical treatment.

Laser treatment: The prerubeotic stage, preglaukomy stage, the stage of open-angle glaucoma and in the presence of clear eyes environments in vascular diseases of the retina we carried out short-term medical therapy (10–12 days), at the earliest stages of the disease, as a stage of preparation for the laser coagulation of the retina, given the the pathogenesis of vascular diseases of the eye. Drug therapy was conducted against the background of the correction included angioprotectors, absorbable, decongestants. Early laser retinal photocoagulation prevents the development of secondary glaucoma as prevents compression of posterior long ciliary arteries. Laser treatment of diabetic retinopathy begins with the appearance of the stromal edema, according to optical coherence tomography. The indication for laser treatment is the height of the stromal edema than 270 microns.

Laser treatment was conducted in a coagulation subthreshold 2–3 OCT stage under control. At the same time requires the payment of blood sugar and blood pressure. In the case of focal or

diffuse retinal edema was performed subthreshold or threshold laser photocoagulation as a focal, sectoral, restrictive or “lattice”.

When thrombosis retinal vein laser treatment started immediately after the medical therapy and was carried out in 2–3 stages. The first phase — careful coagulation multiple hemorrhages. The second stage (2 weeks), the threshold paravasal laser coagulation of the retina and macular area barrage. The third stage (one month after the second) restrictive retinal laser photocoagulation.

In the terminal stage of NVG in the absence of visual functions and expressed pain syndrome cyclophotocoagulation used.

Under open-and-closure NVG recommended antiglaucomatous operation — for our proposed original method — deep sclerectomy implantation xenokollagen drainage (GSE with ICD) (patent number 04336 issued by the IAP State Patent Office of the Republic of Uzbekistan in 2011), which allows to achieve the normalization of IOP.

To check the status of retina and pathogenetic treatment of patients with neovascular glaucoma is important to have transparency in the eyes of media, which makes it necessary to early cataract surgery in these patients, and therefore the presence of patients with complicated cataract at an early stage, phacoemulsification with intraocular lens implantation.

#### Conclusions

1. Taking into account the initial state of the eyes and the whole body approach to treatment of patients with neovascular glaucoma must be individualized.

2. Using the algorithm we developed rehabilitation treatment NVG allows you to select the optimal pathogenetically oriented approach to the treatment of NVG, depending on the stage of the disease, thereby increasing medical and social effect and improve the quality of life of patients.

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## Assessment of results of autodermoplastiks with application of biosynthetic wound coverings of “Biokol” and “Parapan” in patients with deep burns

**Abstract:** Authors analyse results of researches of 42 patients, with deep extensive ambustions III of stage. The comparative analysis of the complex approach in treatment of patients with application combined autodermoplastics — biosynthetic

dressings for injuries of "Biokol" and "Parapanas" is carried out. Influence of dressings for injuries on a current process of injuries is rather studied. Efficiency of application dressings for injuries in complex treatment of the burn wounds, expressed creation of optimum comfortable conditions auto-regeneration is noted.

**Keywords:** combined autodermoplastics, dressings for injuries of Biokol, Parapanas.

### Introduction

The great value in a during and in result of burn illness is in many times defined from a choice of resources of local and general treatment [1; 3; 4].

Despite numerous messages about modern methods of treatment of burn wounds [5; 2], application of dressings for injuries remains one of the important elements [2; 3; 5]. In this context of search of new resources and methods of the complex approach, the creation of comfortable and optimum conditions for auto-regeneration, in treatment of patients suffered from ambustions is in our opinion rather actual.

**The work purpose:** Perfection of methods of complex treatment of patients with deep ambustions.

### Materials and methods

We had studied the possibilities of using combined autodermoplastics in a combination with modern dressings for injuries, in treatment of patients with extensive deep ambustions of III stage. As dressings for injuries we used a modern biosynthetic covering of "Biokol" and reticulated non-traumatic bandage of "Parapanas".

Total number of patients with deep ambustions in CFU treatment had used combined autodermoplastics (CADP) and dressings for injuries of "Biokol" and "Parapanas" included 42 persons. Patients have been divided into 2 groups. First group included 22 patients by whom has been made combined autodermoplastics with use of the reticulated perforated skin rag 1:4 and dressings for injuries of "Biokol". Second group was made by 20 patients by whom has been made combined autodermoplastics with a skin rag perforated 1:4 and application dressings for injuries of "Parapanas".

The total area of ambustions of patients of the first group equaled from 1 to 65 % of the surface of the body. Deep ambustions have averaged 17.2 % of the surface of the body. Ambustions by a flame in 36.4 % of cases, a hot liquid of 54,5 % contact ambustions in 9.1 % of supervision. Among patients of the given group of the man made 16 (72.8 %) women — 6 (27.2 %). The age of patients fluctuated from 26 to 83 years.

The area of affected patients of 2 groups has made from 2 to 63 % of a surface of a body. Deep ambustions have on the average made 23.9 % of the surface of the body. Men constituted 15 (75 %), women 5 (25 %). Etiologic factors of a burnt trauma were — at 12 (60 %) patients — a flame, at 5 (25 %) — a hot liquid and at 3 (15 %) contact ambustions. The age of patients from 24 to 79 years.

Terms of receipt of patients in a hospital were the following: 19 (86.3 %) patients have arrived in first three days after trauma reception, 3 (13.7 %) after 3 days.

The choice of tactics of local treatment depended on a number of reasons: the general condition of the patient, terms of reception of the trauma, depth of defeat etc.

The following surgical interventions on patients were implemented:

- Surgical necrectomy (SN) it was carried out on the average for 5–6 days after a trauma. In terms of performance SN was divided into primary and postponed. Primary necrectomy were carried out in the absence of inflammatory processes in the field of burn wounds for 2 days after a trauma.

- Postponed surgical necrectomy (PSN) were carried out 8 days after the trauma. At 16 patients (38.1 %) PSN had been implemented

for 8–14 days after a trauma, at 24 (57.2 %) for 15–27 days, and 2 (4.7 %) patients for 30 and 35 days. The heavy general condition, deepening of ambustions, later receipt in hospital were — the reasons of performance OSN after 14 days after a trauma.

The average area of one-ambustions removal necrotic tissues consists 5–10 % of the surface of body.

Autodermoplastics carried out in single-step ambustions CFU were under condition of certainty radical treatment of necrotized tissues. Doubtable in viability of tissues cases after the necrectomy carried out, postponed autodermoplastics.

For the better fixation and creation of favorable conditions for regeneration after the autodermoplastics are layed on a film of "Biokol" for the first group and a injury-covering "Parapan" for second group. Dressings for injuries were covered by sterile gauze bandages for some layers.

Bandagings in compared groups were performed for 2–3 days after operation. Only upper bandage was changed, and at presence of wound congestions under a film of Biokol or Parapan, it was replaced after processing of a wound by an antiseptic tank.

### Results

The estimation of results of treatment was spent on the basis of the data of the received during clinical, cytologic and microbiological research of wounds, and also blood analyses in dynamics.

Clinically combination of use autodermoplastics and film dressings for injures of "Biokol" was marked good fixation of a transplant. In case of absence separated wound and appearance with cuticularization area, have been noticed drying of a covering and its dense fixation to the surface.

Crops from a surface of burn wounds of patients have shown that the initial picture in compared groups was almost identical. In 18 (42.8 %) cases from a wound were sowed strain *P. aeruginosa*, in 9 (21.4 %) — *S. aureus*, in other cases — *S. epidermidis*, and level microbic seedings has made 103 colony-formation units (CFU) microbic bodies on 1 sm<sup>2</sup> of a surface of wounds. After application dressings for injuries for 5–6 days, against more active cuticularization there was a reduction of quantity of microorganisms to 101 CFU on 1 sm<sup>2</sup>, only in comparison to group some increase in frequency *St was* marked. *aureus* with 2 (5.7 %) to 3 (8.5 %) cases.

Antibacterial therapy were carried out depending on sensitivity of microflora to antibiotics.

Dabs-prints at all surveyed patients before the beginning of treatment were characterised as inflammatory, and in 15 % of cases — as inflammatory-regenerative. Further 12 (54 %) patients of the first group on 6–7 day has been registered regenerative type of cytograms, in 6 (27.2 %) cases the regenerative-inflammatory type, in 4 (18.2 %) — inflammatory type of cytograms is noted. In the second group indicators in these terms slightly differed: regenerative the type of cytograms is registered in 14 (70 %) cases, regenerative-inflammatory — in 5 (25 %), inflammatory — in 1 (5 %) a case.

For 12 days in dabs-print in group of patients with application of combination CADP + "Biokol" in most cases marked regenerative type of cytogram — 19 (86.3 %) cases, in 2 (9 %) cases — regenerative-inflammatory type and 1 (4.5 %) inflammatory type, and in group with application CADP + "Parapan" in 18 (90 %) a case — regenerative type cytograms, and in 2 (10 %) — regenerative-inflammatory. These days has been noted the sharp increase in

quantity of young cells of a connective tissue (profibroblasts, fibroblasts, macrophages etc.).

The analysis of complications in compared groups has shown that patients of 1 group in 2 (9%) and 1 (5%) second group have been shown the complication in the process of injury in form of a wound suppuration that has led partial lysis of transplants. In 1 group lysis observed on 1.5% of a surface of a body, in comparison group on 1% of a surface of a body.

### Conclusion

Suggested method of implementing modern coverings for injuries after surgical necrectomy and autodermoplastics treatment of patients with ambustion which had been shown by the researchs, favours to maintain necessary optimal environment for the healing of the wound, provides additional protection from mechanical protection. Causes fast cuticularization and effective recovering integrity of skin integument. Reduces the quantity of wound complications.

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## Intensity indicators of bacterial translocation in experimental acute obstruction of small and large intestine

**Abstract:** The purpose was to study the germination of microorganisms in the mesenteric lymph nodes (MLN), liver, spleen, lung, peripheral and portal blood, peritoneal exudates in experiment dynamics for evaluating the intensity of bacterial translocation (BT) at experimental acute obstruction thin (EAOSI) and colon (EAOC). It was found that the of at EAOSI and EAOC intensity of BT or the percentage of germination of microorganisms (PGM) of extraintestinal organs of animals at different stages of the experiment differed. BT intensity was most pronounced in MLN than in the liver, spleen and lungs.

**Keywords:** bacterial translocation, microorganisms, extraintestinal organs, experimental studies, acute obstruction, small intestine, large intestine.

The bacterial translocation (BT) is the passage of bacteria through the mucous membrane of the gastrointestinal tract in extraintestinal body parts [1].

The “BT phenomenon” occurs quite frequently [2; 3]. At present time, this phenomenon is interpreted in two ways: first supporters believe that BT is developing under the influence of stress, injury, or other external extreme impacts and reducing the activity of the immune system, with a pathogenetic link of some diseases; proponents of a second believe that BT is not only the transfer of pathogens endogenous infections in the internal environment of the organism, but also is a natural defense mechanism of the body [4; 5].

It is well known that most often from a normal flora are capable of translocation *Escherichia coli*, *Proteus spr*, some other members of the family *Enterobacteriaceae*, transient strains of *Bacillus subtilis*, Gram-positive aerobes, a low ability to translocate obligate anaerobes [6; 7].

### Purpose of the study

The study and evaluation of germination of microorganisms from the mesenteric lymph nodes (MLN), liver, spleen, lungs, peripheral and portal blood, peritoneal fluid in the experiment for evaluating the dynamics of the intensity of BT in experimental acute obstruction of the small and large intestine.

### Materials and methods

240 white mongrel mice aged 2–3 months and weighing 18–25 g. were used for research. Before the experiments, all animals were divided into groups, then they were for 3 days and weighed thermometry was performed. During these days, weight loss and fever are not detected. Identification and differentiation of the seeded microorganisms carried by conventional bacteriological methods. For this «HiMedia» (India) company culture media used.

In carrying out research using model eksperimental acute obstruction of the small intestine (EAOSI) and colon (EAOC)

proposed Kruglyandskiy Y. M. [8] in our modification. There were conducted 3 series of researches.

All laboratory animals divided into 4 groups:

- Group 1 — EAOSI, n = 72;
- Group 2 — EAOC, n = 72;
- Group 3 — animals which were opened in the abdominal cavity, but not performed obturation (group comparisons, n = 72);
- Group 4 — intact laboratory animals (control group, n = 24).

In turn, 1, 2, 3 groups were divided into subgroups:

- 1a, 2a and 3a — EAOSI EAOC and lasted 24 hours (n = 8);
- 1b, 2b and 3b — EAOSI and EAOC, lasted for 48 h. (n = 8);
- 1c, 2c and 3c — EAOSI and EAOK, lasted for 72 h. (n = 8).

### The results and discussion

It was found that in EAOSI and EAOC the intensity of BT were different depending on the duration of the experiment and its species. We have identified following microorganisms are representatives of normal intestinal microflora — *Escherichia* spp, *Enterobacter* spp, *Citrobacter* spp, *Klebsiella* spp, *Proteus* spp, *Staphylococcus* spp, *Enterococcus* spp, *Bacteroides* spp.

Research evidence that when EAOSI after a 24-hour period the PGM on MLN was  $45.8 \pm 5.9\%$  (n = 33). This rate increased after 48 hours to  $91.7 \pm 3.3\%$  (n = 66), and after 72 hours, this parameter was 100% (n = 72) (P < 0.05).

The PGM indicator different from the liver of the same MLN parameters so if for 24 hours microorganisms were inoculated in the liver  $29.2 \pm 5.4\%$  (n = 21) cases, then after 48 and 72 hours, these parameters were increased — up to  $56.9 \pm 5.8\%$  (n = 41) and  $81.9 \pm 4.5\%$  (n = 59), respectively (P < 0.02 and P < 0.001).

A distinctive feature of microbial inoculation of lung parenchyma was that PGM several times was significantly low compared with other organs described. After forming EAOSI 24 hours the growth of microorganisms of the lung tissue was observed, while the PGM after 48 and up to 72 hours — respectively  $9.7 \pm 3.5\%$  (n = 7) and  $15.3 \pm 4.2\%$  (n = 11). In the study comparing the performance of groups and control positive bacteriological indicators are not obtained.

In the next stage of the research examined the intensity of BT on extraintestinal organs of animals at different times during EAOC. It is found that in the subgroup 2a (EAOC after 24 hours) PVM in MLN was at the level of EAOC indicator —  $41.7 \pm 5.8\%$  (n = 30) versus  $45.8 \pm 5.9\%$  (P > 0.05). However, 48 hours revealed significant differences between these parameters —  $59.7 \pm 5.8\%$  (n = 43) vs.  $91.7 \pm 3.3\%$ , (n = 66) — P < 0.001. The results after 72 hours were identical in EAOSI and EAOC.

Results of studies on the liver showed the following results: PGM after 24 hours  $18.1 \pm 4.5\%$  (n = 13) after 48 hours  $51.3 \pm 5.9\%$  (n = 37) and after 72 hours  $80.6 \pm 4.7\%$  (n = 58). After 24 hours in the liver EAOC of PGM 1.6 times significantly low compared to EAOSI, but after 48 hours of significant differences between the indicators have been identified (P < 0.05).

Trends in research on lung tissue were similar to data PGM spleen. If indeterminate microorganisms failed (0%) after 24 hours, 48 hours later, the figure was  $16.7 \pm 4.4\%$  (n = 12) and 72 hours PGM

significantly increased 2.2-fold (P < 0.001) compared to the previous rate —  $36.1 \pm 5.7\%$  (n = 26). In the spleen in all stages of the experiment between the indicators are not revealed statistically significant differences, but the performance of the PGM lung after 72 hours were significantly different between these models is 2.4 times. As in the studies at EAOSI at EAOC in the group of comparison and control the growth of microorganisms was not found.

The results show that after 24 hours EAOSI in portal blood PGM reached  $33.3 \pm 5.6\%$  (n = 24), while this figure was EAOC  $15.3 \pm 5.6\%$  (n = 11). But after 48 hours of these parameters was significantly increased relative to the previous indicators — respectively  $56.9 \pm 5.8\%$  (n = 41) and  $37.5 \pm 5.7\%$  (n = 27) — P < 0.001. When studying the following experimental data period (72 hours) and at EAOSI and EAOC PGM was found in all animals — respectively 100% (n = 72). It established that these figures 3.0 and 6.5 times were significantly longer than the indicators 24 hour period of the experiment, and respectively 1.8 and 2.7 times significantly longer than the 48-hour indicators of the experiment (P < 0.001).

In these models, and the timing of the experiment conducted microbiological studies with peripheral blood of animals. These results indicate that failed to identify microorganisms in both models after 24 hours. But with an increase in the period of the experiment (48 hours) reported the growth of microorganisms. PGM indicators in both models were respectively  $19.4 \pm 4.7\%$  (n = 14) and  $25.0 \pm 5.1\%$  (n = 18).

The indicators of PGM in peritoneal fluid differed sharply from the peripheral blood parameters, but were close to the data portal blood. Research results according to the duration of the experiment (24, 48, 72 hours) were as follows: the EAOSI respectively —  $48.6 \pm 5.9\%$  (n = 35),  $65.2 \pm 5.6\%$  (n = 47) and  $94.4 \pm 2.7\%$  (n = 68); EAOC respectively —  $34.7 \pm 5.6\%$  (n = 25),  $58.3 \pm 5.8\%$  (n = 42) and  $97.2 \pm 1.9\%$  (n = 70).

It should be emphasized that in both models, only when the 24-hour period were significant differences between the figures obtained (P < 0.05), not significantly different figures for other terms with each other (P > 0.05).

The comparison and control groups in microbiological studies portal blood and peripheral bacteriological negative results were obtained. However, in the control group of the peritoneal fluid after 48 and 72 hours seeded microorganisms PGM equal respectively —  $2.8 \pm 1.9\%$  (n = 2) and  $4.2 \pm 2.4\%$  (n = 3). These controls were identical to other biological samples.

### Conclusions:

1. EAOSI and EAOC intensity BT or PGM extraintestinal organs of laboratory animals at different stages of the experiment differed.
2. BT intensity was most pronounced in MLN and liver, and spleen than in lung. The intensity of this phenomenon was directly proportional to the terms of the experiment.
3. PGM of MLN and liver are recommended as a pilot a microbiological criterion for assessing the intensity of bacterial translocation in the experiment.

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## The effectiveness of ACE inhibitors and sartans patients with acute myocardial infarction in the elderly on a distant stage monitoring

**Abstract:** Therapy normopress and enalapril, against the background of basic therapy has shown efficacy in the development of the pathological process of regression, reduced fraction of atherogenic lipids, improve endothelial dysfunction and recovery of myocardial contractility. At the same time, more pronounced and significant dynamics found in patients with myocardial infarction treated with normopress.

**Keywords:** acute myocardial infarction, hypertension, ACE inhibitors, sartan, endothelial dysfunction.

### Relevance

The problem of rational pharmacotherapy of AMI draws attention due to several reasons. There are a large number of drugs and non-drug therapies used in the treatment of patients with AMI. But quite often there is no objective information regarding the comparative effectiveness of various drugs and treatment regimens. Endothelial dysfunction is the first link in the pathophysiology of cardiovascular-renal continuum, which is based on the progressive vascular disease [1], exacerbated by the influence of risk factors such as arterial hypertension (AH), and leads to kidney and heart failure and death [2]. The blockade of the renin-angiotensin-aldosterone system (RAAS) using ACE inhibitors and sartans and elimination of the negative influence of angiotensin II is a rational approach to achieve regression of endothelial dysfunction [2; 3].

### Aim of work

Evaluating the effectiveness of ACE inhibitors and angiotensin receptor blockers II in the management of patients with acute myocardial infarction arterial hypertension in the elderly.

### Materials and methods of investigation

The clinical observations and studies carried out in the cardiology department of Tashkent City Clinical Hospital № 7 served as a basis for this work. This is a retrospective study of patients admitted to the Tashkent Hospital № 7 with MI. Patients of both sexes were included. As a result of screening of patients in accordance with the criteria included 631 patients 386 of them older than 60 years, the average age was  $70.92 \pm 7.22$ . This open randomized prospective comparative study included 141 patients with the established diagnosis of acute myocardial infarction and arterial hypertension. The study does not include patients older than 80 years with symptoms of decompensated hepatic and renal failure, decompensated diabetes, chronic heart failure (CHF) with over the FC II and III at the time of admission. The patients were selected randomly. Group 1 included 66 patients treated with Losartan in the average daily dose of  $61.9 \pm 32.5$  mg. (Normopress 50 mg, CCL Pakistan), Group 2 included 75 patients treated with Enalapril in the average daily dose of  $6.5 \pm 2.0$  mg.

The groups were comparable on the baseline characteristics (sex, age, premorbid background, extent of myocardial damage, degree of hypertension, comorbidities), and the level of decrease in the heart rate (HR).

All patients received standard therapy (including  $\beta$ -blockers in 21.1% of cases, statins — 29.6%, desagregants — 82%, diuretics — 31%, calcium antagonists — 15%, retard forms of nitrates — 64, 74%) for 2 months. Patients of Group 1 received Normopress, in average daily dose of  $61.9 \pm 32.5$  mg., patients of Group 2 received Enalapril in average daily dose of  $6.5 \pm 2.0$  mg. All patients were surveyed, outcomes were reported, complete physical examination and prospective analysis of patient medical records were carried out. Complete physical examination included the stratification of risk factors: measurement of blood pressure and heart beat rate in dynamics, clinical urine analysis, clinical blood analysis, biochemical blood analysis (including: lipid profile, coagulation profile, troponin I, indicators of antioxidant system of the blood, electrocardiogram (ECG), echocardiogram. All indicators were assessed within 5 days from the date of admission and after 2 months.

Methods of statistical analysis of the study results: we used the package of statistical applications MEDIOSTAT. Besides, the standard methods of variation statistics were used: calculation of mean value, standard deviation ( $M \pm m$ ), and Student's test ( $p < 0.05$ ).

### Results of investigation

At admission, systolic blood pressure (SBP) and diastolic blood pressure (DBP) in patients with myocardial infarction were high (fig. 1). During the 2 months of observation, all patients maintained the self-control diaries reflecting their BP, heart beat rate and state of health. Comparison of the mean values of SBP surveyed on the 20<sup>th</sup>–25<sup>th</sup> day and after 2 months, revealed a significant advantage of hypotensive effect achieved with Normopress, compared to that of Enalapril which provided significantly less effect (fig. 1).



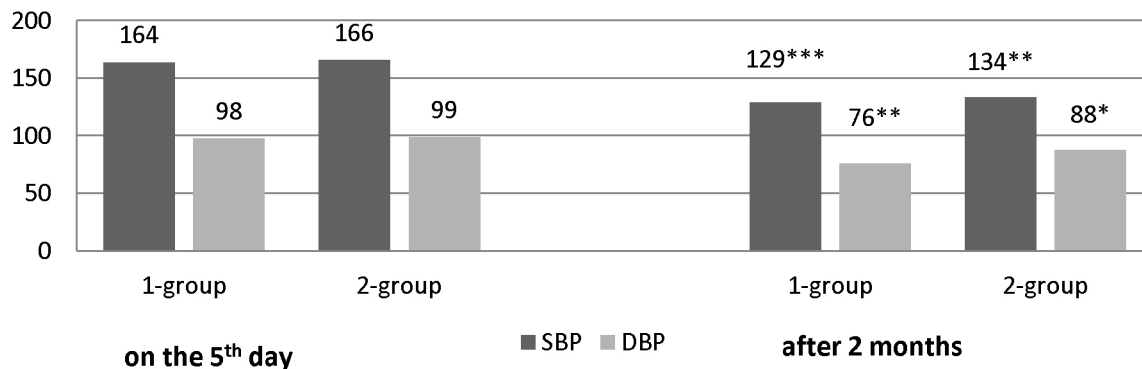


Fig.1. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) values (p\*\*\* < 0.001; p\*\* < 0.01; \* p < 0.05 compared to baseline values)

In the Group 1 decrease in SBP values was 27% (p < 0.001), while in the Group 2 it was 23% (p < 0.01). DBP values in Group 1 reduced by 29% (p < 0.01), while in the Group 2 it

reduced by 12% (p < 0.01). The average day and night heart rates at the beginning and at the end of the study did not differ between the study groups.

Table 1. – Indicators of activity of Lipid peroxidation-antioxidant system (POL-AOS), ratio of POL/AOS in the serum of patients with acute myocardial infarction (M ± m)

Group	MDA, nmol/l		SOD, CU/ml		CT, mkkat/min/l		POL/AOS	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Group 1 N = 66	8.5 ± 0.20*	5.0 ± 0.07**	1.44 ± 0.03*	1.66 ± 0.03	14.0 ± 0.17*	15.99 ± 0.57	6.70 ± 0.30**	3.32 ± 0.07**
Group 2 N = 75	9.3 ± 0.8*	6.36 ± 0.12*	1.4 ± 0.21*	1.67 ± 0.02	14.5 ± 1.6*	15.82 ± 0.55	7.1 ± 0.7**	4.21 ± 0.26*
Control group N = 20	3.3 ± 0.08		2.4 ± 0.03		16.9 ± 0.16		2.2 ± 0.1	

Note: \* — p < 0.05; \*\* — p < 0.01 significance of differences compared to the control group. MDA — malondialdehyde, SOD — superoxide dismutase, CT — catalase.

In both study groups the MDA value increased by 37% and 37% (p < 0.05) compared to the control group. POL/AOS ratio in both groups almost equally elevated compared to the control group (33% and 31%) (p < 0.05). Along with the increase in the above values, the reduction of SOD is registered (60% and 50%) (p < 0.05) and CT (33% and 31%) (p < 0.05).

fundamental importance to improve the functional activity of the NO-system. It was established that Normopress, inhibited the activity of POL process and, consequently, free radical oxidation in the body of patients to a greater extent than Enalapril. One of reasons for the decrease in activity of lipid peroxidation process in the body of patients with AMI was the activation of antiradical defense enzymes — SOD and CT.

In our studies, after 2 months of therapy in Group 1 the serum MDA reduced by 59% (p < 0.01), while in the 2<sup>nd</sup> Group — by 35.5% (p > 0.05). This means, that Normopress and Enalapril reduce the processes of free radical oxidation in the blood of patients with acute myocardial infarction, which, undoubtedly, is of

The study has shown that SOD activity in the blood of patients with acute myocardial infarction treated with Normopress and Enalapril relatively increases and there is no statistically significant differ in the results. A similar pattern is also observed with regard to the CT.

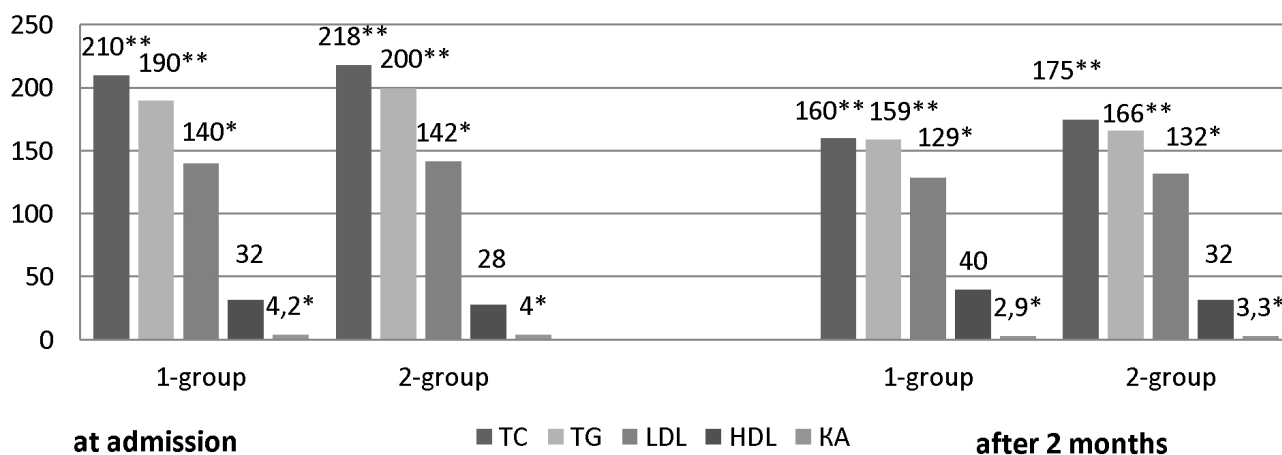


Fig. 2. Indicators of lipid metabolism (p\*\* < 0,01; p\* < 0.05 significance of differences between the groups): TC — total cholesterol; TG — triglycerides; HDL — high-density lipoprotein; VLDL — very low density lipoprotein; LDL — low-density lipoprotein; KA — atherogenic index

A positive dynamics is observed in both groups after 2 months with regard to the blood lipids in patients with myocardial infarction, which is characterized by a decrease in total cholesterol (31 %,  $p < 0.01$ ; 24.5 %,  $p < 0.01$ ), triglycerides (19.5 %,  $p < 0.01$ ; 20.0 %,  $p < 0.05$ ), LDL (13 %,  $p < 0.05$ ; 9 % uncertain (UC)).

On the 5<sup>th</sup> day of admission and after 2 months, all patients have undergone echocardiography. In Group 1 the index of end-systolic volume (ESV) was  $89.41 \pm 1.4$  ml. and in Group 2 it was  $87.07 \pm 1.7$  ml.; the index of end-diastolic volume (EDV) in Group 1 was  $159.6 \pm 2.101$  ml. and in Group 2 it was  $154.45 \pm 2.161$  ml.

The EF indicator in patients with acute myocardial infarction was  $45.21 \pm 0.54$  (Group 1) and  $46.14 \pm 0.61$  % (Group 2), no differences between the groups were detected. On the 2<sup>nd</sup> month of therapy in Groups 1 and 2 a significant uncertain reduction of EDV, ESV and increase in EF were observed.

The results analysis showed that both Normopress and Enalapril lead to increase in serum basic NO metabolites in patients with AMI. Thus, after two months of treatment with Enalapril, the activity of NO complex in serum increased by 49 % ( $p > 0.05$ ). While when taking Normopress, this indicator increased by 50.0 % ( $p > 0.05$ ) in comparison with the initial value (fig. 3).

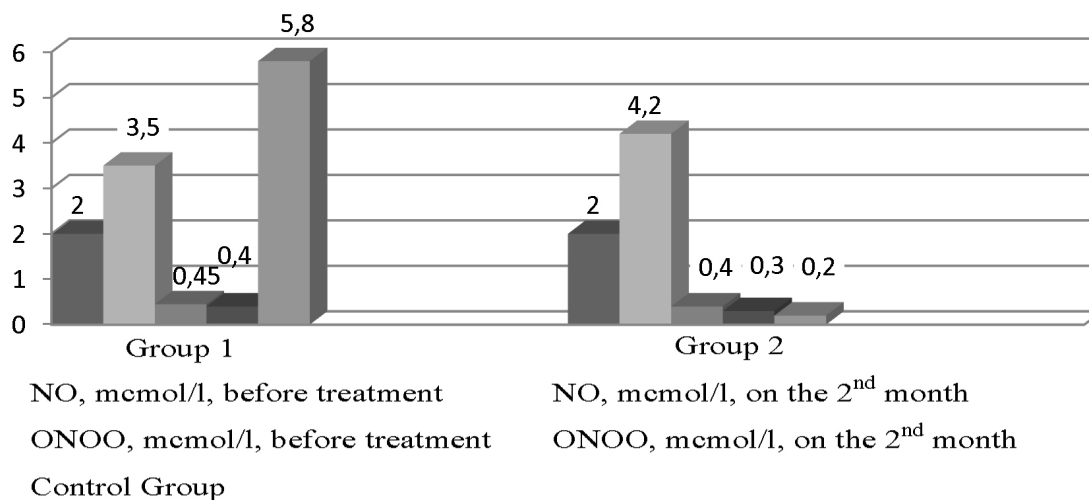


Fig. 3. Indicators of serum NO system in patients with AMI

However, the NO level in patients of both Groups remained significantly lower than in the control group. The reduction was identified in ONOO concentration by 29 % ( $p < 0.05$ ) in the first group and by 11 % ( $p < 0.05$ ) in the second group.

Thus, the 2 month therapy with Normopress and Enalapril, associated with the basic therapy has shown efficacy in the development

of regression of the pathological process, the increase in AOS, reducing the activity of lipid peroxidation process, reducing the fraction of atherogenic lipids, improvement of endothelial dysfunction and restoration of myocardial contractility. At the same time, our research revealed more pronounced and significant dynamics in patients with MI treated with Normopress.

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## Clinical-microbiological parameters of the atopic dermatitis

**Abstract:** This report presents results of the study of clinical features of atopic dermatitis in 120 patients in relation to the character of contamination with staphylococcal flora on the skin of patients.

**Keywords:** atopic dermatitis, pathogenesis, clinical forms, staphylococcal flora, contamination.

The pathological changes in the skin, developing at the atopic dermatitis (AD), result in favorite conditions for growth and development of the total number of microorganisms with predominant staphylococcal flora (predominantly of *Staphylococcus aureus*) and

decrease in quantity of other representatives of the normal microflora (propion bacteria, streptococci, gram negative microorganisms) [1; 3; 5; 6; 7; 8]. As a result the infectious agents have become active inductors of the strengthening of the immunopathological

reactions, being resources of the paradox immune response that results in development of the severe resistant to therapy frequently relapsing forms of atopic dermatitis [1; 2; 4; 7].

#### Purpose

To study character of the clinical development of AD in relation to qualitative and quantitative compositions of the staphylococcal flora of the skin in the patients with AD.

#### Material and methods of research

Clinical methods: diagnosis of AD according to the criteria of J. Hanifin and G. Rajka (1980). Assessment of the severity degree of disease by index ACORAD (Severity Scoring of Atopic Dermatitis).

Microbiological methods were carried out with help of international standardized tests "Liofilchem" (Italy).

Statistical processing of the results was performed with use of the program of Statistica V.55A according to the criteria Shapiro-Willk (2006).

#### Results and discussion

On the basis of Clinic of RSSPMC D and V of MH RUz there were studied 120 patients with AD, of them males were 66 (53.0%) and women — 54 (47.0%) at the age of 4 to 71 years. Control group comprised 36 healthy subjects of the matching age.

The results of microbiological investigation showed that of 120 patients with AD in 96 (80%) there were cultivated gram+ hemorganotropic facultative-anaerobic bacteria from the series of Micrococcaceae — Staphylococcus spp. on the skin in the focuses of lesions. The growth of staphylococcal flora was revealed in all clinical forms of disease, however mostly frequent at lichenoid (28.1%) and pruriginous (23.9%) forms of AD, while at the erythematous-squamous form — in 13.5%, erythematous-squamous form with lichenification — 14.6% and exudative — 19.8%.

Determination of the proper type of Staphylococcus spp in the patients with AD showed that on the skin of the focuses of lesions there was noted growth of Staph. aureus in 58.3% of cases, Staph. epidermidis — in 13.5%, Staph. saprophyticus — in 12.5%, Staph. haemolyticus — in 8.3%, Staph. hominis — in 7.3%. It is interesting that on the skin free from eruptions the growth of Staphylococcus spp. was in 55 (57.3%) patients with AD, of them Staph. aureus — 51.7%, Staph. epidermidis — 20.0%, Staph. saprophyticus — 16.4%, Staph. hominis — 7.3%, Staph. haemolyticus — 3.6%. In the control group of healthy persons the spectrum of Staphylococcus spp strain was as the following: Staph. epidermidis — in 13 (36.1%), Staph. saprophyticus — in 15 (41.7%), Staph. hominis — 5 (13.9%), at the same time Staph. aureus was cultivated in 5.6% of the studying subjects.

In dependence on the clinical form of AD the identification of the type of Staphylococcus spp was characterized by high growth of Staph. aureus in the patients with lichenoid and pruriginous forms — 32.1% and 28.6%, respectively.

Analysis of the parameters with regards to severity course of AD (taking into account the index SCORAD) Staphylococcus spp in the patients with light form (to 50 numbers) was presented by Staph. aureus — in 7 (38.8%), Staph. epidermidis — in 5 (27.8%), Staph. haemolyticus — in 1 (5.6%), Staph. saprophyticus — in

5 (27.8%). At the moderate degree of severity (50–80 numbers) the type spectrum of staphylococcus strain contained: Staph. aureus — in 32 (62.7%), Staph. epidermidis — in 5 (9.8%), Staph. haemolyticus — in 4 (7.8%), Staph. hominis — in 3 (5.9%), Staph. saprophyticus — in 6 (11.8%) patients. However in the patients with severe development of atopic dermatitis (more than 80 numbers) there was found Staph. aureus — in 17 (62.9%), Staph. haemolyticus — in 3 (11.1%), Staph. hominis — in 3 (11.1%), Staph. saprophyticus — in 1 (3.7%).

Study of the level of colonization with Staphylococcus spp. on the skin of patients with AD in the centers of lesions showed that colonization with Staph. aureus was maximum, on the average —  $3129.4 \pm 127.8$  CFU/cm<sup>2</sup>, Staph. hominis —  $114.3 \pm 12.2$  CFU/cm<sup>2</sup>, Staph. epidermidis —  $1421.5 \pm 215.6$  CFU/cm<sup>2</sup>, Staph. saprophyticus —  $180.9 \pm 40.4$  CFU/cm<sup>2</sup>. The increased colonization with staphylococcal microflora was also noted on the skin free from eruptions: Staph. aureus —  $725.5 \pm 12.2$  CFU/cm<sup>2</sup>, Staph. hominis —  $51.9 \pm 10.8$  CFU/cm<sup>2</sup>, Staph. haemolyticus —  $29.4 \pm 5.1$  CFU/cm<sup>2</sup>, Staph. Epidermidis —  $25.2 \pm 5.5$  CFU/cm<sup>2</sup> and Staph. saprophyticus —  $42.7 \pm 9.4$  CFU/cm<sup>2</sup>, that was also differed reliably from features in the group of healthy subjects ( $P < 0.05$ ).

The study of the character of colonization with Staph. aureus in relation to the clinical form of AD, revealed high parameters of lichenoid and pruriginous forms of AD ( $3317.4 \pm 239.7$  and  $3719.5 \pm 144.5$  CFU/cm<sup>2</sup>, respectively). At the same time in erythematous-squamous forms of colonization accounted for  $1930.4 \pm 139.1$  CFU/cm<sup>2</sup>, in erythematous-squamous form with lichenification —  $2668.0 \pm 229.5$  CFU/cm<sup>2</sup>, in exudative —  $2760.0 \pm 295.4$  CFU/cm<sup>2</sup>.

The study of the colonization of skin in the patients with AD in dependence on the severity degree at the hard clinical course of AD showed the higher level of colonization with Staph. aureus —  $3715.4 \pm 135.8^{**}$  CFU/cm<sup>2</sup> in comparison with moderate and mild stage of the process ( $3016.8 \pm 172.5^*$  CFU/cm<sup>2</sup> and  $2088.5 \pm 194.7$  CFU/cm<sup>2</sup>, respectively).

#### Conclusions

The results of the microbiological investigations showed that in spite of absence of the symptoms of secondary infection (pustule, impetigo, folliculitis) in the patients with AD on the skin focal of the contamination in 58,3% of cases there was found growth of microflora of series Micrococcaceae — Staph. aureus with high level of colonization —  $3129,4 \pm 127,8$  CFU/cm<sup>2</sup>. The highest parameters of colonization were registered in lichenoid and pruriginous forms of AD ( $3317,4 \pm 239,7$  and  $3719,5 \pm 144,5$  CFU/cm<sup>2</sup>, respectively). In our opinion the contamination of the skin in the patients with AD with Staphylococcus spp explains the severity of course in these forms that was coincide with the parameters of SCORAD index.

The data obtained confirm significance of microbiological factors in the pathogenesis and clinical course of atopic dermatitis that requires development of pathogenetic approaches to the therapy of dermatosis with taking into account of microbiological status of the skin in patients with atopic dermatitis.

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## **Hemorrhagic stroke in children: link between clinic-anamnestic data and hemostasis**

**Abstract:** To conduct the correlation analysis between clinical and anamnestic data and indicators of the system of hemostasis of children who had a hemorrhagic stroke (HS).

**Keywords:** childhood stroke, etiology, hemostasis, hemorrhagic strokes, ischemic stroke.

### **Background**

One of the major problems of neonatal and pediatric neurology is the Acute Cerebrovascular Accident (CVA) in neonates and infants children (from birth to 3 years). Over the past two decades, the world's attention is given to the group of a formidable cerebral pathology. There is a growing identification of strokes in infants and young children, but the questions of diagnosis and treatment require further improvements, as in present time, it is well known that there is multiple factorial cases of the stroke in this age category. Besides that, even greater difficulty is the lack of common approaches to the treatment required. Thus, in contrast to adults, where ischemic stroke (IS) makes 85% and hemorrhagic strokes 15% of children which are divided almost equally in to approximately 55% of ischemic and 45% of hemorrhagic strokes (HS) [8; 9]. The level of incidence rate varies depending on geographic location, country, nationality and way of life. As noted by Lynch J. K., Hirtz D. G., De Veber G., the incidence rate of stroke of children below 1 year in the USA is 7.8, in France —

about 13, and in older age is barely 2–3 person per 100 thousand of population annually [2; 6; 7].

Hemorrhagic strokes — is intracranial hemorrhage acquired due to changes in blood vessel malformations: anatomic changes of small perforating lentikulo-striatal arteries; saccular cerebral aneurysms; arteriovenous malformations (AVM); amyloid angiopathy; mikroangiomas; arteriovenous fistulas of the dura mater; Intracranial venous thrombosis; septic arteritis and mycotic cerebral aneurysms; carotid-cavernous fistula syndrome Moya-Moya [1; 2; 3; 9].

If we analyze the direct causes of death in the neonatal period, it is revealed that one of the most frequent complications of severe neonatal disease is trombohemorrhagic disorders. It was not enough researched backup capabilities of the system hemostasis especially in preterm infants, both in normal and in other various forms of pathology.

Hemostasis, its mechanisms, as well as the hemostatic system reaction to these or other etiological factors and risk factors, create

the preconditions for the emergence of complexity in the study of types of hemorrhagic strokes of children in particular.

### Objective

To conduct the correlation analysis between clinical and anamnestic data and indicators of the system of hemostasis of children who had a hemorrhagic stroke.

### Study design

In total, the clinical part of the study, 40 patients took part in the different periods of the HS, out of which 72.7 % were male (24 children), and 27.3 % — girls (9 children) aged from birth to 1.5 years (mean age  $62.4 \pm 16.3$  days).

The control group included 20 children aged from 0 to 1.5 years (mean age  $72.4 \pm 19.2$  days), of which 14 boys (70 %) and 6 girls (30 %) had no evidence of acute cerebrovascular circulation at the time of the study.

**The main criteria for inclusion** in the study were: hospitalized patients, aged from birth to 1.5 years with acute cerebrovascular accident on hemorrhagic type, neuroimaging verified and who gave written informed consent from the parents to participate in the study.

**Exclusion criteria were** age of patients over 1.5 years, with acute disorders of cerebral circulation on ischemic type, lack of informed written consent of the parents of the patient to participate in a clinical trial.

### Methods

In the surveyed group it was studied: the main risk factors for hemorrhagic stroke were extragenital history of mothers, complications of pregnancy and childbirth, newborn condition at birth. In the laboratory it was studied the main parts of hemostasis systems: platelet, coagulation and fibrinolytic and anticoagulant systems. Hemostasis indices were determined by the following methods:

- 1) Platelet Aggregation with ADP inducer method "for Born" on the analyzer platelet aggregation "Biola", Russia;
- 2) coagulation hemostasis: activated partial thromboplastin time (aPTT), prothrombin activity of the Quick, thrombin time, fibrinogen concentration on Klaus;
- 3) fibrinolytic system: XII-dependent and fibrinolysis;
- 4) anticoagulant system: antithrombin-III, a modified test system "Reaklot AT-III», protein "C" — screening method.

It was also determined the Soluble Fibrin Monomer Complex (SFMC) and ortofenantrolinic method by Willibrand factor of concentration in the blood plasma.

### Statistical analysis

Data were analyzed using SPSS v 19 (IBM SPSS Statistics, Armonk, New York). During research, descriptive methods and variation statistics were used.

### Results

Anamnestic characteristics were studied and highlighted risk factors, as well as the clinical-neurological manifestations of hemorrhagic strokes of children.

Once again, it is confirmed by the opinions of the greater vulnerability of male children (80:20 %). There was no effect of gestational age on the manifestation of the HS, as in our study emptive number of patients was born in gestational age of 39–40 weeks (90 %). This once again confirms the view that the small gestational age can accompany IVH that was not part of our criteria for inclusion of patients. This fact is well correlated with weight indicators at children birth of the study group.

In 55 % of cases of neonatal condition was assessed as good and 35 % — as satisfactory. Only 10 % of children were born in a serious condition, but later developed HS Clinic, differed its severe neurological and somatic symptoms.

Indeed, virtually every child with persistent jaundice is in group of risk for bleeding, i.e., 50 % of the children in our study had hyperbilirubinemia (indirect) and the protracted nature. In 20 % of cases occurred before the development of hemorrhagic diarrhea disaster and Background Anemia occurred in 12.5 % of cases.

The 35 % was observed entanglement fetal umbilical cord at birth, they likely served as background "disadvantage" for children with HS.

With regard to risk factors for HS, it should be, however, noted that the value of such somatic diseases of mothers of infants with acute violation of cerebral circulation had been, such as anemia 30 ( $0.75 \pm 0.69$ ), renal disease 16 ( $0.40 \pm 0.78$ ), varicose veins in the mother 7 ( $0.18 \pm 0.61$ ), nosebleeds 5 ( $0.13 \pm 0.53$ ). Endocrine pathology was detected in 15 ( $0.38 \pm 0.78$ ) of cases. TORCH infection during pregnancy was detected in 9 ( $0.23 \pm 0.67$ ) — infection in the form of carriers of CMV and HSV. It remains debated issue, which has its «pros» and «cons» as TORCH infections affect on the development of placental insufficiency, chronic fetal hypoxia, and formation of hemorrhagic and ischemic brain lesions of children in the perinatal period. During pregnancy mothers were taking drugs: antibiotics — 9 (27.27 %), anti varicose medicines — 4 (12.12 %), cardiovascular medicines including kurantil — 2 (6.06 %), and in a few cases anticoagulants, antispasmodics.

Table 1. – Characteristics history of children at birth

Indicators	n = 40	%
<b>Gestational age</b>		
28–37	2 ( $0.5 \pm 0.35$ )	5
38–40	36 ( $0.90 \pm 0.48$ )	90
>41	2 ( $0.5 \pm 0.35$ )	5
<b>Birth weight:</b>		
>2500	37 ( $0.93 \pm 0.42$ )	92.5
1500–2500	2 ( $0.5 \pm 0.35$ )	5.0
<1500	1 ( $0.03 \pm 0.025$ )	2.5
<b>Condition at birth:</b>		
Good	22 ( $0.55 \pm 0.80$ )	55
Satisfactory	14 ( $0.35 \pm 0.76$ )	35
Severe	4 ( $0.10 \pm 0.48$ )	10
<b>Neonatal diseases:</b>		
Anemia	5 ( $0.13 \pm 0.53$ )	12.5
Diarrhea	8 ( $0.20 \pm 0.64$ )	20
Bilirubinopathy (HDN)	20 ( $0.50 \pm 0.80$ )	50
Cord entanglement	14 ( $0.35 \pm 0.76$ )	35

It is worth to note that mattered intranatal factors such as:

- 1) the weakness of labor — prolonged labor 21 ( $0.53 \pm 0.80$ );
- 2) the rapid birth 13 ( $0.33 \pm 0.75$ );
- 3) the premature discharge amniotic fluid 9 ( $0.23 \pm 0.67$ ) cases.

Genetically complicated hemostasiological history among relatives (parents, siblings) was diagnosed in 6 ( $0.15 \pm 0.57$ ) patients.

Analysis of obstetric history revealed in 34 ( $0.85 \pm 0.57$ ) cases showed that the children were born by physiological way and in 6 ( $0.15 \pm 0.57$ ) — by Caesarean section.

Neurological examination was carried out in the very acute/acute stage of hemorrhagic stroke type. So, the children observed this pathology often manifested cerebral symptoms vomiting 16 ( $0.40 \pm 0.78$ ), convulsions 25 ( $0.63 \pm 0.78$ ), coma 8 ( $0.38 \pm 0.132$ ) and exit from this state in the form of motor 17 violations ( $0.43 \pm 0.79$ ). Right-sided hemiparesis was formed in 14 ( $0.35 \pm 0.76$ ), the left-hand hemiparesis — 9 ( $0.23 \pm 0.67$ ) cases. Regression of neurological deficits after stroke of children in 70 % of cases there is much better than in adults 33 %.

Clinical ICE statement does not always fit into the framework and had differences with hemostasiogram data. The distortion of the data, an incorrect perception can cause a lack of the correct approach to the treatment of children.

In the study the hemostatic system in children with hemorrhagic stroke, it was found that the indicators of screening tests (APTT, PTI, thrombin time, fibrinogen plasma) were not significantly different from those of the control group (Table 4).

Table 2. – Risk factors for hemorrhagic stroke of children

Indicators	n = 40	%
<b>Motherboard</b>		
Hepatitis	10 (0.25 ± 0.69)	25
TORCH	9 (0.23 ± 0.67)	22.5
Kidney disease	16 (0.40 ± 0.78)	40
Anemia	30 (0.75 ± 0.69)	75
Endocrine pathology	15 (0.38 ± 0.78)	37.5
Phlebeurysm	7 (0.18 ± 0.61)	17.5
Nosebleeds	5 (0.13 ± 0.53)	12.5
Gynecological diseases	11 (0.28 ± 0.71)	27.5
<b>Perinatal</b>		
Premature discharge of water	9 (0.23 ± 0.67)	22.5
Applications obstetric benefits	2 (0.05 ± 0.35)	5
Precipitated labor	13 (0.33 ± 0.75)	32.7
Prolonged labor	21 (0.53 ± 0.80)	52.5

Table 3. – Clinical and neurological symptoms of children with HS

Evidence	n = 40	%
Physiological childbirth	34 (0.85 ± 0.57)	85
Cesarean section	6 (0.15 ± 0.57)	15
Heredity	6 (0.15 ± 0.57)	15
<b>Complaints</b>		
Bleedings	8 (0.20 ± 0.64)	20
Anxiety	35 (0.88 ± 0.53)	87.5
Vomiting	16 (0.40 ± 0.78)	40
Seizures	25 (0.63 ± 0.78)	62.5
Movement disorders	17 (0.43 ± 0.79)	42.5
Hemiparesis D	14 (0.35 ± 0.76)	35
Hemiparesis S	9 (0.23 ± 0.67)	22.5
Impaired consciousness	8 (0.38 ± 0.132)	20
Coma 1-stage	3 (0.08 ± 0.42)	7.5
Coma 2-stage	3 (0.08 ± 0.42)	7.5
Coma 3-stage	2 (0.05 ± 0.35)	5.0

Table 4. – Indicators of the hemostatic system in children with stroke on the hemorrhagic type

Test name	Group HS (n = 40)	Control group (n = 20)
Aggregation ADP concentration $2 \cdot 10^{-4}$ (%)	25.0 ± 5.0	50.0 ± 5.0
APTT, sec.	30.0 ± 2.0	26.0 ± 2.0
Prothrombin index, %	77.0 ± 7.0	96.0 ± 4.0
thrombin time	15.0 ± 2.0	10.0 ± 2.0
Plasma Fibrinogen, g/l	2.9 ± 0.5	3.1 ± 1.0
XII a-dependent fibrinolysis (min.)	20.0 ± 3.0	7.0 ± 2.0
Antithrombin-III, %	99.8 ± 3.0	98.0 ± 2.0
Protein «C», BUT	1.0 ± 0.3	0.9 ± 0.1
Von Willebrand factor, %	94.4 ± 2.0	80.0 ± 10.0
SFMC, mg/ %	9.1 ± 1.1	4.5 ± 0.9

Note:  $P < 0.05$

Aggregation of platelet function with ADP inducer decreased 2-fold compared to the control group. Antitrombin-III concentration did not differ from the control group.

Despite the fact that on average the «C» protein indexes were normal and 5 children (15.0%) of the normalized ratio had reduced protein. The concentration of the von Willebrand factor corresponded to normal values. Content SFMC increased in the third times compared to the control group. It should be noted that 100% of children surveyed plasma fibrinolytic activity was reduced, which leads to thrombosis and indicates the beginning of ICE syndrome.

It is known that in preterm and full-term immature children more pronounced decrease in contact factors (XII factor, prekallikrein, high molecular kiningogen). There has been even more active than in full-term transient fibrinolysis in the first hour of life, followed by a deep depression at its very low level of plasminogen and anti-coagulants (antithrombin-III, «S» of the protein). Taken together, these changes cause less resistance hemostasis system, a significantly higher incidence of as bleeding and intravascular coagulation in the newborn group. Virtually any abnormality, observed in premature and immature infants, can be complicated by bleeding, or DIC.

**Discussion:** In this way, according to a survey of literature, the HS of young children are quite common and require more detailed study into force polyetiology state database. In particular, it is a serious problem the neonatal stroke, perinatal stroke, the outcome of which, in the absence of adequate interpretation may be the highest disability, mortality. The greatest number of violations of cerebral circulation on hemorrhagic type (almost a quarter of all cases) were in children under the age of 1.5 years. Currently existing hematological diagnostic methods, not being available to the public (means hemostasiogram), constitute an obstacle to a more adequate assessment of the HS in infants. Determination of fibrinogen, APTT, PTI, thrombin time is a screening to determine disorders of hemostasis, in particular the disseminated intravascular coagulation.

Thus, the causes of CVD can be malformations of cerebral vessels (aneurysms, arteriovenous malformations), heart disease (malformations, infectious diseases), blood system disorders (coagulopathy, anemia, thrombocytopeny), metabolic and systemic diseases (vasculitis, etc.) What is most important that it is functional immaturity of the liver, especially in infants and young children which requires a more detailed diagnosis through the study and analysis of the hemostatic system.

#### Conclusions:

1. Virtually every child with persistent jaundice is risk for bleeding, i.e., 50% of the children in our study had hyperbilirubinemia (indirect) and the protracted nature. The 35% was observed entanglement fetal umbilical cord at birth, they likely served as background “disadvantage” for children with HS.

2. Anemia during pregnancy 30 (0.75 ± 0.69), uterine inertia — prolonged labor 21 (0.53 ± 0.80) are the main factors subsequent fetal hypoxia.

3. Manifest HS determined expressed concern (87.5%), seizures (62.5%), a sharp decrease in motor activity (42.5%), which should be considered by physicians in the prehospital phase.

4. Determination of fibrinogen, APTT, PTI, thrombin time was a screening to determine disorders of hemostasis, in particular the disseminated intravascular coagulation.

5. To put the disseminated intravascular coagulation for diagnostic value: APTT, PTI, decrease platelet aggregation (even to 0); reduction of antithrombin time. In the presence of normal parameters hemostasiogram it is necessary to conduct an analysis of anti-coagulant factors protein C system.

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## Study levels of emotional empathy patients with relapse of opioid dependence

**Abstract:** Use the “Scale of emotional response» (Balanced Emotional Empathy Scale — BEES) studied the effect of empathy on the emotional level of social adaptation of persons dependent on opioids. Research has shown that in all patients a low level of emotional empathy, which can be seen as a barrier to the successful restoration of family and environmental links between drug addicts in therapeutic remission and impedes their social reinsertion.

**Keywords:** emotional empathy, relapse, opioid dependence.

### The relevance of research

Numerous scientific studies show that the level of social adaptation of persons dependent on opioids, is one of the most important factors influencing the stabilization of remission after discontinuation of the drug [5; 7]. Achieving the goals of social rehabilitation, re-socialization and reintegration of patients into society substantially reduces the risk of recurrent disease [6]. In this connection, great interest is the study of social conditions and personality traits that contribute to or hinder the full social rehabilitation of patients after therapeutic intervention performed.

We have attempted to study the quality of the personality of drug addicts, as emotional empathy, that is, the ability to empathize with another person, the capacity for emotional response to the experience of other people in their daily lives. Studies have shown that empathy reflects the level of development of skills of interaction with other people, so it is closely related to social adaptation

of drug addiction [1]. Exploring the personality traits that facilitate or hinder its harmonious existence in all spheres of interaction with the environment, we can successfully meet the challenges of coping and adaptation of patients with opioid addiction [2; 3; 4]. This, in turn, can serve as an additional resource for stabilizing and prolonging remission.

**The purpose of research:** the study of the influence of emotional empathy to the level of social adaptation of persons dependent on opioids.

### Material and methods

In terms of Republican Drug Treatment Center (Tashkent) clinical and follow-up method examined 51 male patient with the syndrome of dependence on opioid drugs series (code ICD-10 F11.2).

All patients had repeated (at least three) attempts to treat with the emergence of drug relapse after a short-term remissions. The average age of patients at the time of the survey was  $34.2 \pm 5.9$  years.

In 76.4% of patients with prescription drug abuse of opioid number did not exceed 10 years. At the time of the survey, all patients have abused heroin. The study excluded people with comorbid mental disorders, polizavisimostyu from two or more psychoactive substances (code ICD-10 F19), as well as to stop taking opioids, but switched to the vicarious other substance misuse. Follow-up data were obtained on all patients in the period from one month to 3 years from the date of discharge from hospital.

Detailed analysis of the factors contributing to the failure of remission and the development of drug addiction relapses, possible to distinguish two groups of patients for comparative study:

– 1 group consisted of 23 (45.1%) patients who had relapses all ever observed in the dynamics of opiate addiction, there were mainly influenced by endogenous factors that are closely associated with the exacerbation of symptoms of dependence. These included spontaneous actualization irresistible craving for the drug, and affective disorders dissomnicheskie have a significant effect on the occurrence of relapse remission. These factors predominated in the development of relapses in patients with group 1, exerting a significant influence on the occurrence of failures in the early (up to 6 months) periods of remission.

– 2 group consisted of 28 (54.9%) patients who had relapses occurred, usually under the influence of external conditions. This group of factors, conventionally referred to the category of exogenous, including adverse mikrosotsial environment, first of all, contact with drug addicts, family or business conflicts, the lack of employment in the presence of material prosperity. These factors are particularly important in the later (more than 6 months) periods of remission.

To study the emotional empathy to use the “Scale of emotional response” (Balanced Emotional Empathy Scale — BEES), developed by A. Mehrabian and modified H. Epstein [8]. This technique allows analyzing the overall empathic tendencies, the level of expression of ability to emotional response to the experience of the other person and the degree of compliance or noncompliance with the sign of emotional experience of the object and the subject of empathy. The questionnaire consisted of 25 closed-end judgment test assesses the extent of their agreement or disagreement with each of them. Scale assumes 4 answers — “I agree (always)”, “most agree (often)”, “rather disagree (rare)”, “disagree (never)”, which gives an opportunity to express shades of relationships to each communication situation. For every answer is charged from 1 to 4 points. Processing of the results is carried out using a special key. Overall score is calculated by adding up the points. The severity of the individual’s ability to emotional response to other people’s feelings (empathy) is determined by the conversion table “raw” scores to standard scores. empathy level was estimated as follows: 82–90 points — very high, 63–81 points — the highest, 37–62 points — normal, 36–12 points — the lowest, 11 points or less — is very low.

High levels of capacity for empathy are in inverse relation to aggressiveness and a tendency toward violence have a direct correlation with a flexible, compliant, willing to forgive others (but not himself), to carry out routine work.

People with normal levels of empathy in interpersonal relationships are more likely to judge others by their actions than to trust their personal impressions. They are usually well controlled by their own emotional expressions, but often find it difficult to predict the development of relations between people.

People with low levels of empathy in interpersonal relationships have difficulty in establishing contacts with people often do not find mutual understanding with others.

## Results

The analysis showed that at the time of the survey the average prescription opiate abuse in patients of Group 1, where relapses were associated with endogenous factors, was less significant —  $7.6 \pm 2.6$  years than in patients 2 group —  $9.8 \pm 5.3$  years ( $P < 0.01$ ), where relapse occurs predominantly under the influence of external conditions. Thus the patients in group 1 opioid dynamics were observed for at least 3 remission (mean 3.2) and not less than 4 relapses (mean 4.2), while the two groups of patients in remission multiplicity averaged 2.8, relapse — 3.8 ( $P < 0.01$ ).

Despite the relatively smaller prescription opioid abuse in patients of Group 1 at the time of the survey reached more severe signs of social maladjustment. The proportion of patients who discontinued career significantly exceeded similar index in group 2 (31.6% of patients of group 1 and 10.2% of Group 2 patients,  $P < 0.001$ ). The number of patients preserving their marital status, was much smaller than in group 2 (42.1% of patients of group 1 and 71.4% of patients Group 2;  $p < 0.003$ ). Dominated by patients consisted divorced (50.9% of patients of group 1 and 24.5% of Group 2 patients;  $P < 0.01$ ) with a relatively small specific gravity of patients had never married (7.0% of patients of group 1 and 4.1% of group 2 patients;  $P > 0.05$ ).

The number of persons who have been convicted of offenses of various kinds, also was higher among patients of group 1 (45.6% of patients of group 1 and 24.5% of Group 2 patients;  $P < 0.045$ ). This applies, above all, torts related to drug trafficking (42.1% of patients of group 1 and 14.3% of Group 2 patients,  $P < 0.001$ ). The offenses that are not related to the drug (hooliganism), relatively frequently committed group 2 patients (3.5% of patients of group 1 and 10.2% of Group 2 patients;  $P > 0.05$ ).

A comparative study of the ability of addicts emotionally respond to other people’s experience has shown that patients in both groups predominantly characterized by low rates of “Scale of emotional response”. In calculating the average it found that it is in group 1 was 30.8 points in Group 2 — 23.5 points, and the difference between groups did not have statistical significance ( $P > 0.05$ ). This indicated that drug users do not understand the emotional manifestations and actions of other people feel uncomfortable in dealing with them, are not able to be sensitive and responsive to the loved ones. They give an emotional response to a partner state, experiencing at the same time on the opposite modality experiences. Neutral and negatively colored emotional states partner are treated patients with significant distortion. They lack emotional abilities, which are defined as «a system of competences and skills», affecting the ability to cope with the requirements and the ambient pressure. Individuals with low empathy, usually negatively perceived by others, but they do not realize it.

These personality traits led to the selection of patients ineffective behavioral strategies in relationship with others. This, in turn, could greatly impede their social rehabilitation therapy during remission and relapse of disease onset.

Thus, a low level of emotional empathy was detected in all patients, regardless of the predominance of biological and social influences in the mechanisms of opioid addiction relapse. This causes certain difficulties for restoring family links and environmental addicts with other people after treatment, and discontinuation of the drug. The results suggest the need to develop communication skills of drug addicts in treatment and rehabilitation process, the ability to listen and understand others, to describe and reflect their feelings and experiences in order to facilitate social adaptation in remission and prevent relapse of disease.



**Conclusions:**

1. Low level of emotional empathy can be seen as a barrier to the successful restoration of family and environmental links between drug addicts in therapeutic remission and impedes their social reinsertion.

2. Treatment and rehabilitation programs for patients with opioid dependence should include the development of empathic abilities, communication skills, ability to listen, reflect and understand the feelings of others.

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## **Aggregation activity of thrombocytes at patients with chronic generalized parodontitis in combination with an atherosclerosis syndrome**

**Abstract:** To study the significance of functional activity of thrombocytes in pathogenesis of microcirculatory disturbances at patients with ChGP in combination with atherosclerosis syndrome.

**Keywords:** periodontitis, gingivitis, inflammation, endothelial cells, microcirculatory system, coagulation, hypertension, chronic ischemia of the brain, blood platelets.

Epidemiological researches of the population of various regions of our country testify about high prevalence of inflammatory diseases of parodontitis (from 80 to 100 %) in various age groups [3; 4].

In structure of parodontal diseases gingivitis and periodontitis prevail. Diseases of parodontitis adversely act to functions of organs of system of digestion, leading to a sensibilization and infectioning of an organism, and also reduce its resistance. As damaging agents at an inflammation act not only microorganisms themselves, but also their endo- and exotoxins, various enzymes of pathogenicity of bacteria, components of a bacterial cellular wall (lyopolisaharidis, peptidoglicans, teychoid acids). The first visible stages of inflammatory process are haemodynamic changes — vessels in a place of an inflammation of risk are extended, it arises with gas of blood cells with the subsequent exit of leukocytes from a blood channel in a place of tissue damage of parodontitis. In process of vicodilatation there participate such endothelial factors, as thrombinis, hystaminis and leycotrinenum C4. In the present situation thrombinis appear at the expense of activation of vascular-thrombosis (microcirculatory) and coagulation links of system of a hemostasis [1].

The answer mechanism of endothelial cells on action of thrombinis is distinguished and it develops quickly. In the present situation endothelial cells produce endothelies — 1, thrombocytosis growth factor (GsFR) and the activation factor of thrombocytes (VEILS) which strengthen aggregation activity of thrombocytes.

In measure of generalization of pathological process of disturbances of microcirculation grow, and changes in vessels get generalized character both at patients with chronic parodontitis, and at patients with a chronic ischemia of a brain caused by an atherosclerosis. Damage of endotheliocytes at disturbances in microcirculation system is accompanied by development of sludge — a syndrome that is confirmed by the presence of significant amount of thrombocytes, settling down not only in a gleam of vessels, but also actually in a gum mucous membrane. However, now there are only unique works devoted to functional activity of thrombocytes at patients of ChGP in a combination with a syndrome of an atherosclerosis. However, it is necessary to notice that biomarkers of coagulation activity and endothelial cellular activity, and also the subclinical atherosclerosis is improved from parodontal therapy [5]. Taking into account high prevalence of diseases of parodontitis, the given risk factor is considered important from the point of view of public health.

**The work purpose:** to study the significance of functional activity of thrombocytes in pathogenesis of microcirculatory disturbances at patients with ChGP in combination with atherosclerosis syndrome.

**Materials and methods**

For object achievement under our supervision there were 52 patients with ChGP. From them 24 patients were without accompanying diseases; 28 patients — with ChGP in combination

with an atherosclerosis syndrome. Patients were on out-patient treatment of stomatological department of clinics of TSDI. Patients with a syndrome of an atherosclerosis at the age from 40 till 65 years composed basically contingents suffering from disturbance of the brain blood circulation, caused by an atherosclerosis of brain vessels and were under out-patient supervision. At 78.8% of patients the accompanying arterial hypertension has been noted. Criteria of an exception were age above 70 years, a myocardium heart attack in the anamnesis of longitude not less than 6 months, insulin dependent diabetes, presence of malignant new growth. At the given contingent of patients the atherosclerosis syndrome had been established a chronic ischemia of a brain on the basis of carrying out of ultrasonic doplerography of cerebral vessels, estimating a thickness of CIM.

For all 52 examined patients with atherosclerosis syndrome and without an accompanying pathology there was available chronic generalized parodontitis of moderate severity level. At statement of the diagnosis of chronic generalized parodontitis it was used "classification of diseases of parodontitis, accepted on XVI Plenum of the All-Union society of stomatologists" (1983). The comparison group was made by 12 patients at the age of 25–35 years with intact parodontitis without a somatic pathology.

In the work with the examined patients there were followed the ethical principles reflected in the Helsinki declaration of the World medical association (1964).

For an objective estimation of a condition of tissues of parodontitis the examination of patients ChGP was carried on the following indicators: definition of a hygienic index (Green-Vermellion, 1969); definition of capillary — marginal alveolar index (Parma C., 1960); definition of parodontal index (Ruzel A., 1956); test of functional firmness of capillaries on V.I. Kulazhenko (1967); the index of peripheral blood circulation, considered on the basis of indications of firmness of capillaries and time of resolving of hematomas at definition of functional firmness of capillaries (Dedova L. N., 1981). Bleedingness of gums at sounding (Baver G. M., Lemetsky G. I., 1996); depth measurement of parodontal holes were carried on by a direct method; degree of mobility of teeth (Gavrilov E. I., 1954).

Clinic-laboratory observation of all patients was conducted on the standard method including the general analysis of blood and urine.

In blood serum it is defined the maintenance of C-reactive protein, concentration of neutral enolases, protein S-100 and lypoprotein associated with phosphorus-lypasis A2 by a method of immuneferment analysis using the equipment and reactants of firm "HUMAN" and also reactants of firm BCM Diagnostic delivered by firm Bio Chem. Mach (Russia). The maintenance of desquamated endotheliocytes in blood plasma was investigated by method of Hladovec J. (1978). Calculation of the quantity of thrombocytes was carried on by haematological analyzer of firm "Rosh", aggregation degree of thrombocytes, induced, ADF  $1 \times 10^{-3}$  M was carried on by means of agrometer "Payton" (Canada) where it was found degree of aggregation on maximum level of light passing of plasmas after introducing inductor of aggregation. An adhesiveness estimation of thrombocytes to glass balls was carried on by method A. of Hellen (1987).

Static processing was conducted by the use of a package of static programs «Statistica». Reliability of distinctions between groups was estimated by criterion of Student (t). Distinctions were considered statistically authentic at  $P < 0.05$ .

### Results and their discussion

Apparently from the presented results of research (table 1), unlike a banal inflammation of parodontitis, parodontitis combined by an atherosclerosis syndrome was characterised by heavier disturbance of a capillary bloodflow in parodontitis that in our opinion, is caused by systemic atherogenic process and endothelial dysfunction. Character of an immune inflammation at patients of ChGP of average degree combined by an atherosclerosis syndrome accompanied by authentic increase of level C-reactive protein in 9 times whereas at patients with ChGP it exceeded indicators of group of comparison in 4.9 times ( $P < 0.05$ ) that specifies in development of inflammatory process and strengthening of atherogenesis. At patients with ChGP combined by a syndrome of an atherosclerosis disturbance of a capillary bloodflow is caused by a system of atherogenic process and dysfunction of endothelial cells of vessels it is shown by a level growth of desquamated endotheliocytes on the average in 2.3 times in group of combined disease and on 20% in group ChGP at comparison with indicators of healthy people.

Table 1. – Biochemical indicators of blood and functional activity of thrombocytes at patients ChGP in a combination by an atherosclerosis syndrome

Indicator	Comparison group n = 12	Patients ChGP of average degree (are healthy)	
		Without an atherosclerosis syndrome n = 24	An atherosclerosis syndrome n = 28
C-reactive protein, mg/l	5.81 ± 0.34	28.6 ± 1.13*	54.6 ± 4.12*
Lypoprotein combined by phospholypasis A2, mkg/l	164.0 ± 9.61	261.2 ± 9.91*	428.4 ± 11.43*
Desquamated endothelial cells, $1 \times 10^4$ /l	2.74 ± 0.19	3.03 ± 0.18	6.41 ± 0.42*
Protein S-100, ng/ml	0.15 ± 0.02	0.16 ± 0.63	0.36 ± 0.03*
Heyronal enolasis, ng/ml	2.98 ± 0.15	3.01 ± 0.24	8.51 ± 0.72*
Quantities of thrombocytes. $1 \times 10^9$ /l	288.6 ± 9.61	278.0 ± 8.63	255.0 ± 11.0*
The sum of active forms of thrombocytes, %	12.4 ± 0.79	18.4 ± 0.91*	26.4 ± 0.81*
Index of adhesiveness of thrombocytes, %	44.6 ± 2.12	45.8 ± 1.09	49.6 ± 1.68*
Aggregation of thrombocyte to stimulation of ADF, $1 \times 10^3$ M of Tma %	38.1 ± 16.9	40.4 ± 2.04	49.8 ± 2.46*

Note: \* — reliability of distinctions  $P < 0.05$ .

One of the most studied markers of atherogenesis in last years is lypoprotein — combined phospholipasis A2 (LpPhLA2). The atherosclerosis is a specific syndrome of an inflammation, the starting moment of pathogenesis of which is blockade of absorption by cells

by LPNP and inside of cellular deficiency of essential saturated fat acids. At an atherosclerosis there is a blockade of receptive absorption by cells of LPNP, and as consequence of it, activation of LPNP absorption by functional phagocytes (monocytes, macrophags),

in a consequence of that arises deficiency of essential saturated fat acids that activates an inflammation syndrome. Feature of enzyme of LpFLA2 is specificity concerning a vascular inflammation and is about the inflammatory enzyme, showing physiological activity in the relation of intims of arteries.

Apparently from the received results of research, indicators of studied enzyme (LpFLA2) at patients of ChGP combined by an atherosclerosis syndrome authentically raise and have exceeded values of an indicator of group of comparison in 2.6 times ( $P < 0.05$ ) whereas concerning group of patients with ChGP it have exceeded reference values on 59%. Hence, the elicited fact specifies in direct correction between indicators of studied enzyme with weight of disturbance of capillary of blood circulation not only in tissues of parodontitis, but also expressiveness of endothelial dysfunctions and display of an atherosclerotic syndrome.

The revealed changes in character of endothelies of vessels, their morphological and functional damage is one of the development reasons of atherogenesis at combined form of ChGP with an atherosclerosis syndrome. In the present condition research of markers of a chronic ischemia of a brain can reflect dysfunction degree of endothelial cells and neyrodegenerative processes in a brain.

Carried on by us immunepherment analysis of the maintenance of protein S-100 at patients of ChGP combined by a syndrome of atherosclerosis has shown to the high values of level of studied protein in blood serum on the average in 2.4 times concerning indicators of group of comparison that is in our opinion caused by disturbance of trophics of nervous cells in the conditions of a cerebral ischemia as astrocytes and microglies are the basic sources of synthesis of protein S-100. Along with disturbance of trophics of a nervous tissue at patients with ChGP an atherosclerosis syndrome disturbance of a carbohydrate exchange in nervous cells is noticed at an ischemia that results in to an exit of neyronalic enzyme of glycolysis — enalases in blood where its concentration has exceeded reference values in 2.9 times ( $P < 0.05$ ).

The considerable role in development of a chronic ischemia of a brain and microcirculatory frustration plays functional condition of thrombocytes which is a link of vascular-thrombocytaric, coagulation and fibronilitic rings of haemocoagulation systems. Adhesion and aggregation of thrombocytes against an exit in a blood channel of biologically active substances can promote occurrence of haemorrhagical syndrome.

Recently it is proved that one of factors stimulating synthetic activity of endothelium is activation of thrombocytes with discharging of serotanium, ADF, thrombinum [2]. The endothelial dysfunction observed at combined form of disease promotes increase of aggregation activity of thrombocytes for the account of thrombomodulator of ADF. Apparently from results of research, at given groups.

At patients we observe the increase of the sum of active forms of thrombocytes in 2 times, an adhesiveness index of thrombocytes to % and the maximum aggregation at stimulation of ADF to 31% ( $P < 0.05$ ).

Activated thrombocytes substantially promote generirising of thrombinum, catalizing and providing factors for reactions of humoral coagulation cascade.

#### Conclusions

The generality of an inflammatory syndrome in tissues of parodontitis and an atherosclerosis syndrome (a chronic cerebral ischemia) is more full natural, as both syndromes form the same cells: endothelial, monocytes, thrombocytes, etc. in both situations at participation of sytacinum synthesis and secretion in blood of the protein acute phases and lypoproteins, proteases increase. Clinically both the inflammation syndrome, and process of atherogenesis can prolong long time, both syndromes are nonspecific and consist of the same functional reaction. In the present situation functional and structural damages of endothelia of vessels are accompanied by disturbances in vascular — thrombocytic hemostasis link at ChGP combined by an atherosclerosis syndrome.

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## Surgical treatment of non-epithelial tumors mandible

**Abstract:** In this article were studied surgical treatment of non-epithelial tumors mandible. In the period of 2013–2015 the department head and neck tumors NRCO MH of R. Uzbekistan were treated 26 patients with non-epithelial tumors of the

mandible. The average age of patients was 27 years. Men were 8 (30.7%), 18 women (69.3%). Anatomically tumor damaged more than the horizontal part of the mandible in 20 (76.9%) patients, followed by posterior segments — processes in 5 (19.2%), and anterior segment (tuberculum mentale) in 1 (3.8%) patients. Of the 26 patients in 14 were detected malignant tumors (sarcomas), and the remaining 12 benign tumors. Of the sarcomas most histologically detected osteosarcoma and fibrosarcoma, and benign tumors of the most detected osteoblastoklastoma — giant cell tumor. Patients with sarcomas before operation were performed chemo radiotherapy depending on histology. Patients with benign tumors was performed only surgical treatment.

**Keywords:** non-epithelial tumors of the mandible, surgical treatment of the mandible.

### Results

All 26 patients were performed surgical treatment of the mandible, with subtotal resection of the mandible was performed in 1 (3.8%), gemimandibuloektomiya in 6 (23.0%), segmental resection of the mandible in 14 (53.8%), resection an edge in 3 (11.5%) and the removal of the tumor was performed in of the mandible 2 (7.6%) patients. In 3 (11.5%) patients after removal of the tumor and at the same time was performed reconstruction of the mandible with a titanium plate. Of the 14 patients with sarcoma in 12 patients at the same time performed a combined operation — the upper cervical lymph node dissection, and in 2 patients due trismus and the prevalence of tumors in the first stage performed a tracheostomy operation. Of the 5 patients in whom the tumor spread to the infratemporal and pterygopalatine fossa in 2 patients within 1 year after the operation was a recurrence of the tumor.

### Conclusion

Surgical treatment in the combined, comprehensive or self-treatment is a leading method in the treatment of sarcomas of the mandible. Integrate consideration histological form of tumor dissemination and radical surgery are factors of improving survival.

### Introduction

Despite the fact that the tumor of the mandible is the visual localization of the tumor and the available medical examination, the majority of patients to the moment of starting treatment has locally advanced form of the disease. In this situation, the only option to carry out radical treatment is combined or complex treatment, which is the main stage of the operation [1].

Anatomical topographical features of the area, proximity to vital organs complicate removal of the tumor within the healthy tissue or at a considerable distance from the tumor edge. This leads to the fact that the main reason of adverse outcomes for tumors of the jaws are relapses, which, according to various authors, occur in 33–69% of cases.

This in turn has led to the search for additional methods of influence on the primary tumor, the nature of the application and that their effectiveness is largely depend on the type of tumor and its degree of differentiation. Regional metastases are found in 10–15% of cases, mainly in poorly differentiated forms of tumors [2; 3; 4].

It should be noted that in some cases, the number of tumors of the jaws — angiosarcoma, malignant fibrous histiocytoma, leiomyosarcoma, unclassified sarcoma — using of chemoradiotherapy leads to a complete clinical and morphological effects.

Bone marrow malignant sarcomas are highly sensitive to radiation and drug therapy tumors with early development of regional and distant metastases. In this regard, for the treatment use chemoradiotherapy treatment and only when residual tumor relapse or conduct surgery [1].

In recent years, are developed a variety of methods and techniques of regional intra-arterial chemotherapy for locally advanced cancers of the maxillofacial region. They help reduce the toxic effect of chemotherapy and to increase their concentration in the tumor, resulting in enhanced their therapeutic effect and subsequently reduces the amount of surgical intervention [5; 6; 7; 8; 9; 10; 11]. As

seen in the treatment of tumors of the mandible it depends on many factors and therefore the aim of our work is to improve the treatment of non-epithelial tumors of the mandible.

### Materials and methods

In the period 2013–2015, in the department of head and neck tumors RORC MoH Uzbekistan. We treated 26 patients with non-epithelial tumors of the mandible. The average age of patients was 27 years. Men were 8 (30.7%), 18 women (69.3%). Anatomically tumor affects more than just the horizontal part of the mandible in 20 (76.9%) patients, followed by posterior segments — processes in 5 (19.2%), and anterior segment tuberculum mentale in 1 (3.8%) patients. Of the 26 patients from the 14 detected malignant tumors (sarcomas), and the remaining 12 benign tumors.

The most frequently diagnosed osteosarcoma 3 (21.4%) and fibrosarcoma in 3 (21.4%) patients, then — chondrosarcoma in 2 (14.3%), angiosarcoma in 2 (14.3%) in 2 reticulosarcoma (14.3%), malignant ameloblastoma in 1 (7.1%) and mikrosarkoma in 1 (7.1%) patients.

Of the benign tumors found most Osteoblastoklastoma — giant cell tumor in 6 (50%) patients. Patients with sarcoma were performed preoperatively chemo radiotherapy depending on histology. One patient was performed intraarterial regional chemotherapy. Patients with benign tumors was performed only surgical treatment.

### Results and discussion

Evaluation of the effectiveness of neoadjuvant chemo radiation therapy was performed in all 14 patients. The results of treatment were evaluated by objective data in dynamics, according to X-ray examination, ultrasound, MDCT, MRI and morphology. Neoadjuvant chemotherapy and radiation therapy is used to increase resectability and improve the anti-tumor effect. All patients after neoadjuvant therapy showed a significant decrease in pain in the tumor lesions, headaches, lockjaw reduction associated with reduction in tumor size. Example — Fig. 1 and 2.

All 26 patients underwent surgical treatment of the mandible, and the subtotal resection of the mandible was performed in 1 (3.8%), gemimandibuloektomiya 6 (23.0%), segmental resection of the mandible in 14 (53.8%), the edge resection 3 (11.5%) and the removal of the tumor was performed in of the mandible 2 (7.6%) patients. In 3 (11.5%) patients after removal stage reconstruction performed mandible titanium plate.

Using titanium reconstructive plates of various designs for of the mandible defect compensation on the one hand, is the easiest method, and on the other — by using to strict indications enables to achieve high aesthetic and functional performance. In this case the surgeon will have to perform two tasks at once, the first radical removal of the tumor and the second at the same time performed reconstruction of the mandible.

Of the 14 patients with sarcoma in 12 patients at the same time performed a combined operation — the upper cervical limfodisektsiya, and in 2 patients due lockjaw and the prevalence of tumor intubation started with a tracheostomy. In these cases, the tumor had locally advanced form. Example — Fig. 3 and 4.

Of the 5 patients in whom the tumor spread to the infratemporal and pterygopalatine fossa in 2 patients within 1 year after the operation indicated tumor recurrence. Thus, in the treatment of tumors of the mandible using an integrated approach. Preoperative

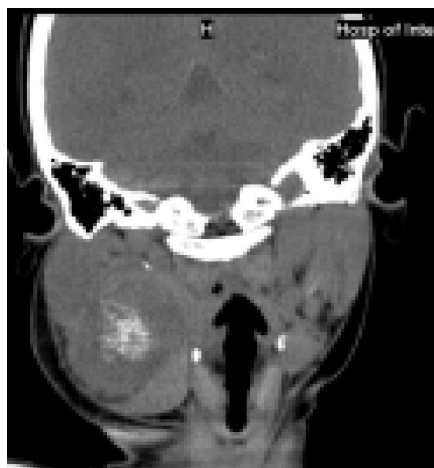


Fig. 1. MSCT of the patient R. before chemotherapy

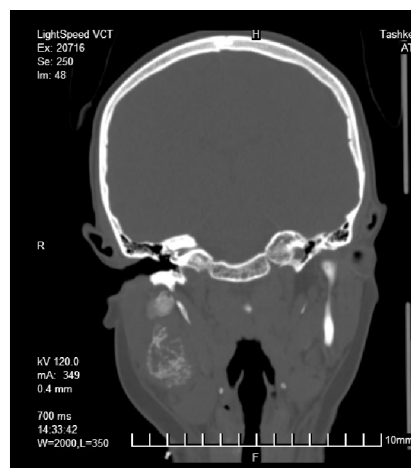


Fig. 2. MSCT patient R. after chemotherapy

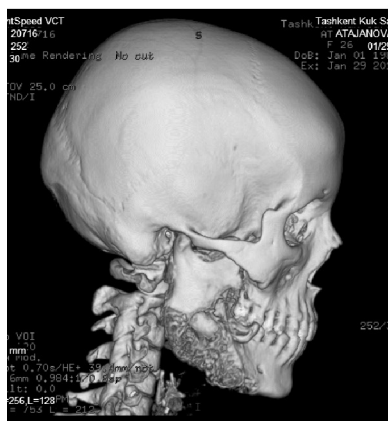


Fig. 3. Patient R. affected part of the mandible when the local prevalence of sarcoma



Fig. 4. Patient R. remote macropreparations

### Conclusion

Surgical treatment in the combined, complex or self-treatment is a leading method in the treatment of sarcomas of the

mandible. Integrate consideration histological form of tumor incidence, preoperative chemoradiotherapy and providing radical surgery are factors improving survival.

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## **Comparison of modified radical cystectomy with traditional in bladder cancer patients with comorbidities**

**Abstract:** The paper analyzed 65 cases of bladder cancer who undergone traditional and extraperitoneal radical cystectomy with ureterocutaneostomy. Patients included the study had a number of complications and comorbidities that limited volume of surgery. Radical cystectomy with extraperitoneal access objectively shorter. Postoperative rehabilitation faster, it decrease the risks associated with surgical interventions in the peritoneal cavity.

**Keywords:** bladder cancer, radical cystectomy, comorbidity.

### **Introduction**

In the structure of cancer pathology bladder cancer (BC) takes the 9th place. The global death rate from bladder cancer in 2008 was 4.4: 100 000 in men and 1.1: 100 000 — women. BC takes third place among urological and 2<sup>nd</sup> place among oncurological pathology [1; 2; 3].

In Uzbekistan, according to Cancer Registry, in 2014 the incidence of bladder cancer has reached 1.3 : 100 000 and the mortality rate of 0.6 : 100 000.

In the world of 80 % of diagnosed cases of bladder cancer are non-invasive or T1 [1; 3]. In Uzbekistan, according to the Cancer Registry, nearly 70 % of bladder cancers are diagnosed muscular invasive. Thus 41 % of patients with stage III and 13 % identified in stage IV. According to the above-mentioned reports, at least 30 % of patients, from newly diagnosed with bladder cancer, we can perform organ-preserving treatment.

According to the literature, the incidence of postoperative complications after radical cystectomy varies very widely — from 19 % to 64 % [5].

Compared with failure of intestinal and urinary anastomoses, paresis (obstruction) of the intestine more common complication after radical cystectomy, which was observed in 23 % of patients in recent studies [6].

Ureterocutaneostomy (UCS) after radical cystectomy remains the main method of urinary diversion in our region, as in most cases of bladder cancer are diagnosed at later stages T3-T4, and somatic status of patients does not allow performing the operation. Surgical treatment takes many hours, traumatic, requires highly skilled operator and a special post-operative care.

UCS remains in the EAU guidelines and recommended a certain contingent of patients in whom it is impossible to perform a more complex and difficult operation [4; 7].

### **Materials and methods**

We conducted analysis of 65 cases of BC in the male patients T2–4aN0–2M0 stage, treated in the department of urology of Tashkent city oncology dispensary 2010 to 2014.

I — group of patients undergoing traditional radical cystectomy with bilateral ureterocutaneostomy (30 patients).

II — group of patients who underwent extraperitoneal radical cystectomy with bilateral ureterocutaneostomy (35 patients).

The average age of the patients was in the group I — 63 years, in the group II — 65. All patients included in the study were older than 50 years. In 50–59 in both groups of 8 patients. 60–69: I group — 11 patients, II — 13; 70–79: I — 10, II — 12 group; 1 patient in the I and 2 patients in group II were older than 80 years.

In both compared groups patients had invasion depth T2–16 in group I (53.3%) and in II — 17 (56.6%) patients, respectively. 9 (30%) patients in the first and 11 (33.4%) patients from the second group diagnosed T3 invasion. From I group 5 (16.6%) and II group 7 (20%) patients had signs of germination in prostate and ureterohydronephrosis. In all cases Histological analysis showed transitional cell carcinoma.

13 % of patients in the first and 23 % in the second group had histologically proven metastases in the lymph nodes.

2 patients in group I and 4 in the II diagnosed one side ureterohydronephrosis due to the invasion to the ureter.

Patients included in the study had a number of complications and co-morbidities, which limited the long time traumatic surgery (Tab. 1).

Table 1. – Complications caused by tumor and comorbidities

Complications/comorbidities	I group	%	II group	%
T4 a- (hydronephrosis, invasion to neighbor organs)	5	16.6	7	20
Diabetes mellitus	3	10	2	5.7
Anemia	12	40	16	45
Cardio vascular diseases (arterial hypertension cardiac ischemia, circulatory failure)	21	70	19	54.3
Digestive system diseases	5	16.6	7	20
Operations in abdominal cavity	1	3.3	3	8.6
Hematuria	12	40	13	37.1

Note: One patient could have multiple comorbidities

As can be seen from the table, most of the patients — 21 (70%) of the first and 19 (54%) of the second group — had cardiovascular system diseases.

Determining perioperative risk, we used the comorbidity index of Charlson. In our view this index is convenient for use and evaluation of physical status of the patients. In our survey more than 70% of patients had an index of 3–5. 16.6% of patients in the first and 25.7% in the second group are identified with the index  $\geq 6$  above. It should be noted, that patients with a high index were operated due to the presence of hematuria or other complications which might worsen further results of treatment or life-threatening. Only 6.7% of patients in the I and 2.9% in the II group had comorbidity index  $\leq 2$ .

Patients in the first group performed radical cystectomy by traditional laparotomy with excision of adjacent peritoneum on the bladder.

Extraperitoneal radical cystectomy procedure is performed without access to the abdominal cavity. During the operation, after dissecting the fascia transversus abdominis opened space Rezius. On vasa deferentia level peritoneum is moved upward to visualize the common iliac vessels. The first step is performed bilateral pelvic lymph node dissection including the obturator fossa. Cystectomy begins by isolating urachus and the removal of the bladder wall from adjacent peritoneum. Subsequently, operation continues in the traditional way.

### Results

Analyzing the results in the groups we noticed greater number of postoperative complications (Table 2). We associate this phenomenon with the initial state of patients before surgery, which was a predisposing factor for the development of a greater number of complications. In postoperative period in group 1 — 12 (40%) patients and in group 2 — 8 (23%) observed complications that required medical measures. The first group was observed more intestinal paresis — 5 (16.6%) than in the second group — 1 (2.8%).

Table 2. – Postoperative complications

Complication	I-n (%)	II-n (%)
Intestine Paresis	5 (16.6)	1 (2.8)
Pneumonia	1 (3.3)	1 (2.8)
Wound infection	4 (13.3)	2 (5.7)
Lymphorrhoea- chylorrhoea	3 (10)	2 (5.7)
Urinary tract infection	3 (10)	2 (5.7)
Lymphostasis	2 (6.6)	2 (5.7)

Note: One patient could have multiple comorbidities

Postoperative complications according to the classification of the Clavien-Dindo: I degree complications were observed in 5 patients I group and 4 in the II group; II degree complications 5 and 3, respectively. Complications were eliminated by conservative and medical treatment. 2 (6.6%) patients in group I and 1 (2.8%) in the II were observed III degree complications. In this cases were performed surgical treatment of infected wounds under local anesthesia (Table 3).

Table 3. – Postoperative complications according to Clavien-Dindo classification

	Total patients (%)	I	II	III	IV	V	complications n (%)
Gr. 1	30 (100%)	5	5	2	0	0	12 (40%)
Gr. 2	35 (100%)	4	3	1	0	0	8 (23%)

The duration of the operation was 1.5 hours to 3 hours 20 minutes, the average duration of the operation in group I was  $143 \pm 5$  minutes, in II —  $135 \pm 5$  min.

In the postoperative period, the average hospital stay was in Group I — 10 days, in II — 8 days.

Implementing extraperitoneal cystectomy, we noted the following advantages. This technique provides a reduction in the duration of the operation (2.0–2.5 hours). Integrity of peritoneum is preserved and there is no bowel contact with the atmosphere, which in turn reduces the risk of adhesive processes, reducing complications such as intestinal paresis, disruption of water and electrolyte balance in the early postoperative period. It provides easy access to revision of regional lymph nodes and perform pelvic lymphadenectomy. Immediately after surgery, the patient can start enteral nutrition. It enables early activation of patients after radical cystectomy and early rehabilitation.

### Conclusion

Radical cystectomy with extraperitoneal access is shorter compared with conventional cystectomy and reduces the risks associated with the operational aggression. Postoperative rehabilitation period is shorter, compared with the group that traditionally cystectomy was performed.

Extraperitoneal cystectomy in patients with comorbidities reduces the risk of possible complications and expanding group of patients whom can be performed radical surgery.

Extraperitoneal radical cystectomy is the preferred operational method for bladder cancer with urine diversion through ureterocutaneostomy.

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## **The role of digital mammography in the differential diagnosis of small form breast cancer with underlying diseases of mammary glands (Literature review)**

**Abstract:** The article contains an overview of publications devoted to differential diagnosis of small form breast cancer with underlying diseases of mammary glands. Currently, the most common methods of differential diagnosis are clinical, X-ray and ultrasonic methods. Studying of modern diagnostic of malignant neoplasms showed the need for the early detection of the disease, before the onset of symptoms or signs, concerning which patients would subsequently applied for medical aid. The valuation of early detection of breast cancer is that, it becomes possible to detect cancer at an early stage, when it has non — invasive character and can be completely cured.

**Keywords:** breast cancer, screening mammography, ultrasound, digital mammography, multislice computed tomography, differential diagnosis.

Breast cancer (BC) is a serious medical and social problem in many developed countries, and in recent years — in developing countries too [6]. In 2008, in the world diagnosed 1.38 million new cases, compared to 500 000 cases in 1975, accounting for 23 % of all cancer cases in women and 16 % of deaths [20, 28]. BC in the last 8 years, In Republic of Uzbekistan consistently ranked 1st in structure of cancer deceases [4]. In 2015, the absolute number of cases of BC was 2915. From these, 1590 patients were in I – II stage, 991 patients in III stage, and 334 patients in stage IV of BC (According of the National Cancer Research Center of Uzbekistan, cancer register). In recent years, the death rate from breast cancer in Uzbekistan is leading cause of death among cancer deceases and continues to increase in absolute and relative terms (3.4; 3.9; 4.2; and 4.2 per 100 000 women in 2011; 2012; 2013 and 2015 according of the National Cancer Research Center of Uzbekistan, cancer register). Control the growth of breast cancer is not possible due to lack of effective pathways of primary prevention [15]. Accordingly, the current is early diagnosis of the disease, which may have an impact on mortality [24]. It was offered many different types screening of breast cancer: self-examination, physical breast examination, ultrasound, radiometry, electrical impedance tomography, etc. [12, 2]. Despite the variety screening methods of breast cancer, a recognized effective method in the world is X-ray mammography [14; 16]. The introduction of mammography screening contributed to a significant increase in detection of breast carcinoma *in situ* (CIS), accounting for one author 15–20 % of clinical cases [5], and on the other — 20–30 % [31]. According to Luke C. and Priest K. [22; 10], in Australia as a result of mammographic screening CIS increased about 7 times in the last 20 years in comparison with the increase in the incidence of invasive cancers — about 40 %.

Abduraimov A. B. et al. studied 115 women with suspected breast nodal education [3]. Age of patients ranged within 19–82 years. Depending on the morphological types of tumors examined patients was

as follows: BC — 65 (56.6%) patients, 26 fibroadenoma (22.6%), cyst — 10 (8.7%), nodular breast — 9 (7.8%) lipoma — 5 (4.4%). The aim of this study was to explore the possibilities of multislice computed tomography (MSCT – mammography) in diagnosis and determining the prevalence of breast cancer. The study was conducted with absolute intravenous contrasting. During the MSCT – mammography without intravenous contrasting in majority cases densitometric indicators of glandular tissue in fibro-cystic mastitis did not differed from malignant process in the breast, which caused serious difficulties in differential diagnosis.

The study Zakharova N. A. was to evaluate the results of the implementation of mammography screening in Khanty-Mansiysk Autonomous Okrug — Ugra for the period 2007–2012 years [7]. In the region 249 106 women has been carried out of preventive breast examination. For the period the target population coverage of screening mammography was 67.5 %. In total 624 women were identified with a malignancy tumors of mammary glands. This indicates that the analog mammography ineffective in detecting the background of breast diseases.

Korzhenkova G. P. and colleagues examined for digital mammography, women seeking to Moscow Cancer Research Center. N. N. Blokhin [8]. During the work, they drew attention to the high possibilities of digital systems to identify nodules in women with radiographically dense breast tissue. The author believes that, due to the small sample of patients to make serious conclusions are not currently possible.

Radiology (ACR) The American College to standardize the terminology used to describe a mammogram, and further optimization tactics recommended use a BI-RADS system (the Breast Imaging Reporting And Data System — a system of interpretation and recording of breast imaging). According to requirements of the BI-RADS system, the protocol should include a description of the structure of the breast (I), pathologic findings (II) and conclude with setting



category BI-RADS (III). In a study of American authors estimated positive predictive value of categories 0–5 for the diagnosis of breast cancer through mammography comparison data with the results of histological examination of the postoperative material. It was found that out of 40 tumors B-RADS 2 were all benign, from 141 tumor BI-RADS 3 malignancies were 2% (3), from 936 tumor BI-RADS 4 malignancies were 30% (279) and from 170 tumors BI-RADS 5 malignant were 97% [25]. Particular difficulties in the differential diagnosis has microcalcifications with sclerosing adenosis and early cancers, which located in a limited area. Kharchenko V. P. et al. surveyed 39 women with local accumulation of microcalcifications, clustered in a limited area without a visible tumor nodule, revealed cancer in 28 observations, 11 — sclerosing adenosis [17]. In all cases it was histological confirmation of the diagnosis. Ultrasound microcalcifications such a small size was not visualized, but in 24 of 28 cases (78%) of cancer at the site of accumulation of microcalcifications detected typical sonographic signs of malignancy — areas of reduced echogenicity, heterogeneous structure, with indistinct contours. At the same time on mammograms nodules were not differentiated. In 11 cases have been identified sclerosing adenosis. Of these, ultrasound only in 2 cases (18.2%) had area with reduction echogenicity with crisp boundaries. For the most typical cancer were worm-like calcifications or lumps, having an irregular shape. The authors also noted out that for cancer more common characterized small calcifications of up to 500 microns, and their combination with dust-like calcareous inclusions.

In a study of Finnish radiologists sonography did not allow to detect microcalcifications in most cases [26].

The mammography remains the main method to detect microcalcifications.

The key and most significant in practical terms, of course, it is the question of choosing the adequate scheme of patient examination with non-palpable tumor and determining the indications for surgical treatment. According to Sickles E. A., in the presence of “probably benign” non-palpable lesions on mammogram should be recommended to follow-up [27]. Dynamic observation

of the 3184 impalpable “probably benign” formations, breast cancer was diagnosed in 17 cases (0.5%). The author believes that this tactic to avoid a large number of unnecessary surgical biopsies.

Vega A. and colleagues were analyzed 619 cases of non-palpable mammary tumors by comparing mammography data with the results of an open biopsy or stereotactic cor-biopsy [29]. The authors believe that the “probably benign” non-palpable lesions should be recommended to follow-up. The ratio of benign and malignant tumors in this study was 4:1.

Lee C. H. et al. summarized the results of follow — 298 dynamic observation tumors, diagnosed on the basis of stereotactic cor-biopsies as benign [23]. On control mammograms the negative dynamics were recorded in 21 cases, which required additional biopsy in 18 patients. Malignant tumors were diagnosed in 2 patients. The authors conclude that a control mammogram after 6 months after stereotactic biopsy of non-palpable benign tumor is a reasonable tactic. According to the American authors, stereotactic cor-biopsy is indicated for tumors of categories 4 and 5 by BI-RADS classification [18; 19; 32].

Velichko S. A. and colleagues analyzed 47,000 primarily studied women in the period from 1996 to 2003. They believe that the mammography imaging and interpretation of pathological processes considerably complicates in age of reproductive women with fibro — cystic disease [30; 21].

In the majority of works by Russian authors considered issues of diagnosis and treatment of benign tumors palpable or non-palpable breast cancer, whereas, in practice, the main task of the doctor — the differential diagnosis of pathological processes in a particular patient [11; 13; 1; 9].

For a complete diagnosis and evaluation response of conducted treatment at small forms of breast cancer with underlying diseases of breast, use an analog mammography is not enough. So, digital mammography should firmly take its place in the diagnostic algorithm. The lack of work on these issues awakens a more accurate and detailed study of the role of digital mammography in the differential diagnosis of breast cancer with underlying diseases.

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## The impact of prognostic factors on the recurrence of stomach cancer

**Abstract:** The study included the results of retrospective studies conducted in 128 patients with recurrent gastric cancer. Retrospective analysis of prognostic factors on the recurrence of stomach cancer showed that non-adherence of one factor during the operation was observed in 6 (4.7%), 2-factors in 72 (56.2%) of 3 or more in 50 (39.1%) patients. In terms of resection, in 114 (89.1%) patients relapsed gastric cancer was determined after distal subtotal resection in 8 (6.3%) after the proximal subtotal resection in 6 (4.7%). The most important prognostic factor of treatment of SC is a radicalism of performed surgery. Based on the above mentioned data it can be concluded convincingly that, the reasons for recurrence was non-compliance with the principles of radicalism in the main group, in comparison with the control group, where was a low rate of recurrence (3.8%), duration of recurrence-free period 22.4 + 0.4 months and in more than 47% cases late relapse was diagnosed. This demonstrates the importance of minimization of negative prognostic factors affecting the abidance of the principles of radicalism.

**Keywords:** prognostic factors, stomach cancer, recurrence, surgery.

### Actuality

Stomach cancer (SC) has taken a crucial position in the structure of cancer incidence and mortality [4]. Furthermore, an aggressive forms predominant amongst the morphological forms of SC, that are characterized by infiltrative growth, early lymphatic dissemination and low resectability [5].

A high qualified level of surgical technique as well as the development of combined and expanded operations with maximum compliance of oncologic principles will abet to improve significantly the survival of patients with SC, but even after the overextended surgical interventions, tumor recurrence takes leading position in case of main cause of death [1; 2]. The prognosis of survival of patients

with gastric cancer is primarily determined by the ability to perform radical surgery. Only a few numbers of non-radical operated patients have one year survival [9].

According to the literature the frequency of recurrence after surgery for gastric cancer composed at 20–48 % [5; 7]. Amongst the patients, who have been undergoing to radical surgery, the most important criterions of the prognostic components are degree of tumor differentiation, localization, process stage, growth form, adequacy of dissection, resection and type of reconstruction. With regard to literature there is the concept of the time of recurrence: up to 3 years — early, and after 3 — later [3].

Analysis of modern literature over last 10 years has shown that, in general, there has been very few works devoted to the problems of diagnosis, treatment and prevention of gastric cancer recurrence. As Blokhin N. N. pointed out (1981), recurrent gastric cancer, unlike the primary tumor characterized by a high biological activity, expressed a tendency to infiltrative growth, high level of invasive growth and frequent attaching to the adjacent organs. For many years the question of the necessity and appropriateness of the recurring surgery for relapsed gastric cancer has maintained its actuality among scientist [6; 8].

Nowadays, feasibility of re-interventions for recurrent gastric cancer that develops in the remaining part of the tumor has been already determined. Undoubtedly, it should be removed, but still it has not been clearly explored the possibility of a surgical method for recurrent gastric cancer with esophageal-intestinal anastomosis after gastrectomy [3].

Thus, providing surgical care to patients with recurrent gastric cancer remains unsolved, another word, here is no consensus on surgical tactics with recurrent gastric cancer, what caused our interest to this issue. **The aim of this study** is to determine the role of the main prognostic factors in the development of gastric cancer recurrence, and to improve methods of early diagnosis.

#### Materials and methods

The study included the results of retrospective studies conducted in 128 patients with recurrent gastric cancer who were treated at abdominal surgery department of the National Cancer Research Center (NCRC), in the period from 2002 to 2014.

From 128, in 79 (61.7%) patients with the primary tumor process, surgery was performed in the general treatment hospitals, in 40 (31.3%) cases surgery was performed in regional oncologic dispensaries, in 9 (7.0%) occasions was were performed in the clinic of NCRC. In terms of resection, in 114 (89.1%) patients relapsed gastric cancer was determined after distal subtotal resection in 8 (6.3%) after the proximal subtotal resection in 6 (4.7%).

A retrospective analysis with aim of identifying the causes of recurrence of gastric cancer conducted by the following criteria:

1. Familiarization with the records of diseases from the hospital, where surgery was performed.
2. Familiarization with the protocol of operations (on request).
3. Carrying out repeated clinical-laboratory and endoscopic studies to clarify the location of the tumor, tumor resection volume and type of reconstruction.
4. Re-examination of the pathomorphologic materials.
5. Re-biopsy and morphological examination.
6. Exploring the results of research methods before and after the operation. The data shows, that all of these operations were carried out without complying the principles of radicalism or principles were complied partially

In order to determine whether these prognostic factors are important for the development of gastric cancer recurrence there

was included a control group with radically operated 448 patients. These patients underwent surgery at the abdominal department of NCRC, in the period from 2009 to 2011. The entire volume of operations in these years, we have specially to trace a possible relapse within the next 5 years.

The study included 2 groups: the first group (n = 128) major surgery carried out without basic principles of radicalism; the second control group (n = 448) surgical intervention was conducted with keeping all principles of radicalism. In the second group the volume of operations were as follows:

1. Standard radical distal subtotal resection in 112 (25.0%) cases;
2. Standard radical proximal subtotal resection in 31 (6.9%) occasions;
3. Standard radical gastrectomy in 295 (65.8%) patients were performed.

#### Results of the study

Analysis of the results of a retrospective study in the main group showed:

1. Of the 114 patients who underwent distal subtotal resection in 58 (50.9%) cases a tumor spread on the body of the stomach, which is required the implementation of a standard radical gastrectomy.

2. Inadequate resection and reconstruction by Billroth I were performed in 34 (24.8%) patients. This type of reconstruction in oncology practice has not been applicable due to the inadequacy of the volume of resection. In many case, for the formation of gastro-duodena-anastomosis without tension, surgeons deviate from the recommended amount of resection with ligation of the left ventricular artery and vein. Unfortunately, recurrence appeared after reconstruction in the area of the anastomosis Billroth-1, resectability has not exceed 10% as the intergrowth of the tumor in the head of the pancreas and liver gate.

3. We have established metastatic lymph nodes in almost all patients of the main group, who were performed inadequate N2 lymph node dissection, which was confirmed by ultrasound examination, carried out before and after the operation. Enlarged metastatic lymph nodes were determined along the celiac trunk, common hepatic and splenic artery. The main reason for inadequate lymph node dissection was the lack of experience and practical skills of the surgeons performing the operation in this volume.

4. Low differentiation tumor was verified in 68 (53.1%) patients, in which according to the standard of treatment, regardless of localization, approved performing total gastrectomy, except for the first stage of the process.

5. Prognostic unfavorable type of tumors, endophytic and infiltrative growth, occurred in 79 (61.7%) patients.

6. The third stage of the process, according to the protocol, was determined in 109 (85.2%) cases, stage 4 in 19 (14.8%) patients.

Retrospective analysis of prognostic factors on the recurrence showed that non-adherence of one factor during the operation was observed in 6 (4.7%), 2-factors in 72 (56.2%) of 3 or more in 50 (39.1%) patients.

According to modern surgery strategies of SC, in 92 (71.8%) cases, in order to ensure radicalism there was necessary to perform a standard radical gastrectomy. The analysis reveals that, indications for distal subtotal resection has not exceed in 28.2% (36) patients. Unfortunately in these cases there was not performed an adequate lymph node dissection, and in 14 (38.8%) cases Billroth I reconstruction was implemented.

Summarizing the retrospective analysis, it might be concluded that in the case of 71.8% was made inadequate resection without

considering location, form of growth, grade of the tumor, and lymph node dissection. Despite the fact that, in 28.2% cases the volume of operation has been selected correctly, lymphadenectomy volume D2 has not been carried out, as required by the standard. As a consequence, in 38.3% cases the result was inadequate. A retrospective analysis represents that, early relapse was observed in all 128 cases, disease-free survival was  $5.4 \pm 0.4$  months.

A retrospective analysis of patients in the control group ( $n = 448$ ) illustrates that, patients that have been carried out operations in compliance with all principles of radicalism showed recurrences appeared only in 17 (3.8%) cases within 5 years. Therefore, after subtotal resection the distal recurrence was detected in 7 (7.1%) patients with gastric remnant, after proximal subtotal resection in 3 (9.7%) and total gastrectomy in 7 (2.4%) occasions. In 9 (52.9%) cases, there was an early, and 8 (47.1%) late recurrence.

As can be seen from the data presented the lowest rate of recurrence was observed after standard radical gastrectomy, which is 3 times less than distal subtotal resection and 4 times than proximal subtotal resection.

Consequently, we cannot exclude the adequacy of compliance with all the principles of radicalism in the performance of surgery in

this study. In spite of fact that most relapses occur on leaving a certain part of the stomach after distal and proximal subtotal resection, does not exclude the possibility of recurrence due to multicentric growth of SC, which is not always can be possible to determine. It has been proven that the duration of recurrence-free period was  $22.4 \pm 0.4$  months in the control group, which is four times more than in the main group.

#### Conclusion

It should be admitted that, the most important prognostic factor of treatment of SC is a radicalism of performed surgery. Based on the above mentioned data it can be concluded convincingly that, the reasons for recurrence was non-compliance with the principles of radicalism in the main group, in comparison with the control group, where was a low rate of recurrence (3.8%), duration of recurrence-free period  $22.4 \pm 0.4$  months and in more than 47% cases late relapse was diagnosed. This demonstrates the importance of minimization of negative prognostic factors affecting the abundance of the principles of radicalism. These comparisons has been proven absolutely, the main causes of recurrence of SC has been surgery, which was performed without taking into consideration factors that defines the significant role in the manifestation of early recurrent SC.

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## Dynamics of immunologic and virological indicators in HIV natural course in perinatally infected children

**Abstract:** The perinatal infection initiation route was revealed to be characterized by higher rates of immunodeficiency progression. It seems to be due to prenatal infection as well as early damage to the immature immune system of child by HIV. The virus concentration in perinatally infected children from the supervision start and by month 30 from the infection manifestation has been, accordingly, 5 and 2 times higher than in parenterally infected children that suggests a more adverse course of the disease when the child was infected vertically.

**Keywords:** HIV, children, perinatal transmission, CD4 Lymphocytes, viral load.

**Background:** The epidemic of HIV/AIDS is relatively recent in comparison with other countries with known history of the disease. The presented research of dynamics of immunologic and virological parameters in HIV-positive children depending on the route of transmission is the first for the time being [1; 3].

According to literature, in the absence of antiretroviral therapy (ART), the HIV-infection in perinatally infected children develops in one of the two variants: in 10–25% of children, the infection quickly progresses with development of AIDS and lethal complications at the first year of their life, and in 75–90% of children

the infection progresses much more slowly with the first AIDS symptoms occurring at the age of 8 years on average [2; 4; 5].

The basic laboratory parameters of HIV-infection progression are immunologic (CD4<sup>+</sup> lymphocytes level) and virological (the HIV RNA concentration in blood — viral load).

#### Research objective

Revealing characteristic features of dynamics of immunologic and virological indicators in HIV natural course in children infected perinatally.

#### Study setting

The research has been conducted from 2008 to 2013 at the clinic of the National Centre to Struggle against AIDS and the HIV department of the Scientific Research Institute for Virology.

#### Criteria of inclusion:

- Verified diagnosis of HIV 1-infection;
- Age 0-5;
- No ART.

#### Material and methods

To study the dynamics of immunologic (CD4<sup>+</sup> lymphocytes) and virological (viral load i. e. the HIV RNA concentration in blood) indicators the data of 40 children (Asians) at the age from 0 till 5 years with the diagnosis of HIV-infection have been analyzed. The diagnosis was made on the basis of clinical

and laboratory data according to MoH of Uzbekistan order 80 of 28.03.2012.

The children involved in the research were divided into groups depending on the route of infection initiation. Group 1 (the study one) included 20 children infected perinatally, 20 children with confirmed parenteral route of infection transmission composed group 2 (the control one). Only the children who were not on antiretroviral therapy (ART) have been included in the research. The children were not treated with ART for some reasons, e.g. the absence of clinical and immunologic indications, impossibility to ensure adherence to the treatment, refusal of parents from the treatment, etc. The analysis of the dynamics of CD4<sup>+</sup> lymphocytes and viral load in the children under study has been made in the following chronological sequence: 1 test on revealing HIV-infection, then in months 6, 12, 18, 24 and 30 after revealing of the infection or registration of the infant at a health center. As the enrolled children were under 5 years, the relative concentration of CD4 lymphocytes (%) determined by the standard method (flow cytometry) has been analyzed. The viral load was evaluated by detection and determination of HIV RNA concentration in blood by the method of polymerase chain reaction (PCR — Real Time).

#### Results and discussion

The dynamic of CD4<sup>+</sup> lymphocytes changes in children depending on the route of infection transmission are shown in Fig. 1.

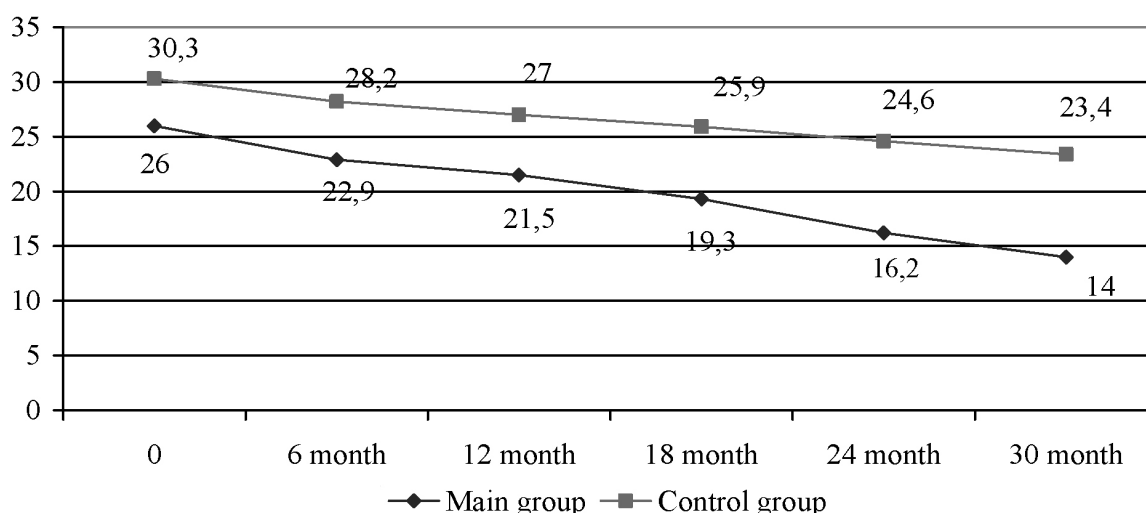


Fig. 1. Dynamics of relative concentration of CD<sup>+</sup> lymphocytes in children depending on the transmission route

As the figure demonstrates, the initial CD4 lymphocytes indicators in children on revealing the infection/health center registration varied depending on the transmission way. For instance, in children with a perinatal route, the initial CD4 lymphocytes values were lower and corresponded to the moderate or expressed degree of HIV-associated immunodeficiency (by the WHO classification), whereas in the control group, this indicator made 30.3% on the average and, depending on child's age, corresponded to insignificant degree of immunodeficiency or its absence (according to the National Protocol "Rendering medical aid to HIV/AIDS children", appendix 5 to UzMoH order 88 of 30.03.2012).

It should be emphasized that at the time of the research, according to the National Protocol being in force in Uzbekistan, antiretroviral prevention in pregnant women began from 28 weeks of gestation (or from 24 weeks at the best). This can be a possible explanation of the fact that some children of the study group were infected by HIV prenatally and at birth they already had the developed failure in the system of immunologic response.

The further chronological analysis of CD4 lymphocytes showed that the speed of a decrease in the lymphocytes subpopulation in

blood was higher in the group of perinatally infected children. For instance, at month 30 after the start of the observation the indicator's average value made 14%; it suggests severe immunodeficiency with no dependence on the child age. In month 30 in the group of parenterally infected children, the CD4 lymphocytes indicator made 23.4% on the average (moderate immunodeficiency).

Lower speed of immunodeficiency progression in the group of parenterally infected children seems to indicate that in the given group, there was no actual infection transmission in the prenatal period and at early infant age when the immune system is immature and has not been fully formed. Thereupon, infection transmission in more advanced age was characterized by the better adaptation abilities of the child immunity contributing to supporting higher values of the CD4 lymphocytes level in the absence of antiretroviral therapy.

Thus, the analysis of the dynamics of CD4 lymphocytes indicator has shown that in children with perinatal HIV-transmission, severe immunodeficiency develops much faster that, in turn, predicts an adverse malignant course of the disease, unlike in children infected parenterally. It seems to be due the fact that children

with perinatal HIV transmission were infected before complete maturation of their immune system and both clinical manifestations and immunologic dysfunctions develop much faster than in elder children and adults.

The virological indicators (viral load, VL) do not recognize a HIV-infection stage (while immunologic and clinical data do) as the do not reflect a body condition (the immunity status), and indicate only the virus replication activity. While in adolescents and adults, the VL values can be used for predicting the risk of immunodeficiency development in future, while in children in

particular at the first year of their life it is difficult to do because of constant very high VL values.

Usually at birth, the viral load is  $< 10\,000$  copies/ml, later on, within first two months of life, it slowly grows to  $100\,000$  copies/ml, and then slowly decreases by 4–5 years. Such dynamics of the viral load essentially differs from the dynamics of viral load in adults as fast enhancement and fast decrease in viral load are observed within several months after the HIV-infection acute stage [2].

The analysis of the dynamics of the viral load indicator (HIV RNA) in a natural course of the disease is presented in Fig. 2.

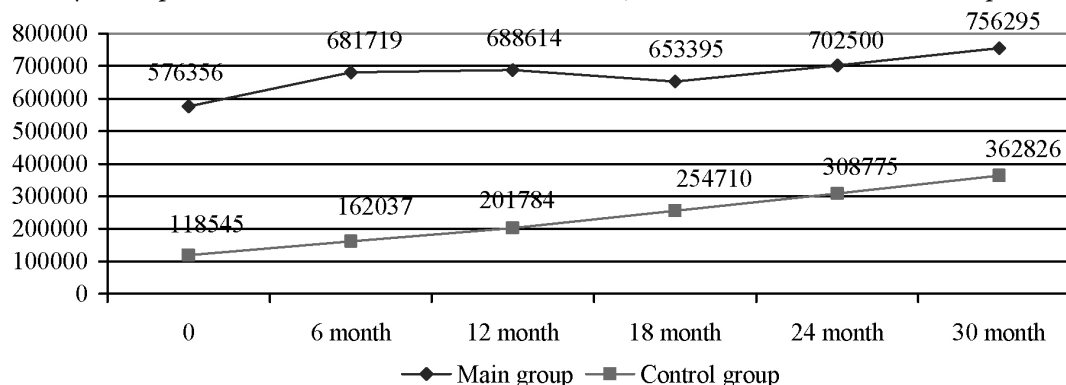


Fig. 2. Dynamics of the viral load in children depending on the infection transmission route

As it can be seen in the figure, in children with perinatal HIV transmission, much higher VL values were initially registered in comparison with the children of the control group; the values were almost 5 times higher than in the controls. As the disease progressed, the children of both groups showed an increase of HIV RNA concentration in blood. However, the VL values in both groups were not still equal. In month 30 from the start of the research, the VL indicators in the study group were 2 times higher than the values of the control group on the average.

There similar laws of viral load dynamics have been described and various explanations why children of early age infected vertically do not have an expressed decrease in the concentration of the virus in blood are offered [5]. According to one of them, at birth the child has incomparably higher levels of  $CD4^+$  lymphocytes, i. e. “there are more wood for the fire” and his/her immature immune system is not able to cope with a high concentration of the virus [1]. Another explanation concerning the HIV high concentration in vertical transmission of the infection suggests a transmission of virus strains which have mutated to escape the response of the mother’s immune system. Since the child inherits half of mother’s HLA alleles, the virus, having adapted to the maternal immune system, carries less antigen determinants which are able to form complexes with HLA molecules and to be recognized by the immune system [3; 4].

According to our findings the dynamics of viral load and that one of  $CD4^+$  lymphocytes have turned to be the independent and

not interconnected criteria characterizing the course of perinatally initiated HIV — infection (by Pearson’s coefficient which in the study group was 0.137, in the control group — 0.262). Our findings are in agreement with the literature data. For instance, the meta-analysis of 17 studies involving 3 941 children not on ART or receiving mono-therapy with zidovudin, has demonstrated that the viral load and quantity of  $CD4$  lymphocytes are independent predicting markers of development of a terminal stage of the infection, AIDS and death [2]

#### Conclusion

Thus, in Uzbekistan, the characteristics of dynamics of the basic immunologic and virological parameters in HIV — infections in Asian children with a perinatal route of transmission in comparison with children infected parenterally have been studied. In perinatal transmission, the initially suppressed immune response of the child in the course of disease progression was determined to aggravate further and, after the lapse of 2–3 years from the time of infection transmission, severe immunodeficiency is being formed that predetermines an adverse clinical course of HIV-infection. Concerning the indicator of HIV viral load, an unfavorable trend was revealed as well which manifested itself in a high concentration of the virus that on the average is 2 times higher than in parenterally infected children. The revealed unfavorable trends dictate necessity and expediency of earlier ART start in children with perinatally transmitted HIV-infection to decrease the risk of development of the advanced stages of the disease and death.

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## The role of chemotherapy in prophylaxis of the liver echinococcosis recurrence

**Abstract:** In analysis exposed the results of treatment 513 patients, operated in Samarkand State Medical Institution's clinic of surgical separation during for the 10 years (2006–2015). On the occasion of primary the liver echinococcosis were operated 379 (73.9%) sick. From all the groups of operated patients, 207 patients were limited of limited of surgical operation, chemotherapy were not hold (2006–2008). And other 306 operated patients patients were hold chemotherapy in full content (2008–2015). The frequency of recurrence of the patients without chemotherapy has formed 9.7% (n = 20). Patients after prophylactic chemotherapy recurrences noted only in 3 (0.9%) events.

The primary operation on cause of the liver echinococcosis without supporting phylactic chemotherapy, held on in condition of the modern high-tech surgical institution, does not guarantee from recidivation of the disease.

**Keywords:** chemotherapy, liver echinococcosis, prophylaxis.

### Introduction

Contemporary condition of the liver echinococcosis surgery can not be recognized as satisfactory, because after primary performed operation a considerable number of recurrent forms resulting in repeated operations is observed [2; 3].

On evidence different authors, frequency recurrence after surgical treatment of echinococcosis in different localization consist about 10% and hesitant within 3–54% [1; 5]. Most of complicated problem represent repeating and multiple recurrence of echinococcosis, in the time which may be lethal outcome.

### Materials and Methods

In analysis exposed the results of treatment 513 patients, operated in Samarkand State Medical Institution's clinic of surgical separation during for the 10 years (2006–2015). On the occasion of primary the liver echinococcosis were operated 379 (73.9%) sick.

The portion of multifocal echinococcosis are consisted 26.9% (n = 102). Repeatedly on the occasion of the liver echinococcosis and organs of abdominal cavities were operated 134 patients: about recurrent — 74 (55.2%), residual — 13 (9.7%), disseminated abdominal cavities of echinococcosis — 7 (5.2%), about implantation of echinococcosiss — 39 (29.1%), about reinfestation of echinococcosiss — 1 (0.7%). From them 19 patients were operated in our separation, on 379 primary operation frequency of recurrent consisted 5.0%.

The rest of 115 patients, which income to repeating treatment, were operated to other surgical centres.

All admitting patients were effected a complex of clinical, laboratory and instrumental researching. Among the instrumental methods of researching are administered radiography, USD and KT.

According to sizes of the sac echinococcosis, its number and localization, the growth parasite of echinococcosis, the complication of character, the condition of fibrous capsule, the general condition of patients were applied to different methods of echinococcectomy and to the methods of liquidation leavings of cavity.

For intraoperative manipulation of Hydatid sac most safety and available for practical use were 80–100% glycerin, which heated till 70°C temperature. Glycerin is active even for significant delution, warrants of its most safety, that proved experimentally [4].

It was detected, that hot solution of glycerin causes death 100% protoscolaxes during  $1 \pm 0.2$  min., and complete destroy of acephalocysts occurs on the average in  $3 \pm 0.5$  minutes of exposition.

### Results and its discussings

From all the groups of operated patients, 207 patients were limited of limited of surgical operation, chemotherapy were not hold (2006–2008). And other 306 operated patients patients were hold chemotherapy in full content (2008–2015).

Albendazole was used in dose 10–12 mg/cg/24 hours recommended WHO (1983). Preparations are assigned discontinuous courses (1 month treatment and 15 days — pause). Number of treatments courses in each observing were selected very seriously individually depending on its size, number and the disposition of sac.

During a treatment was hold regularly (1 time in 15 days) clinical, laboratory researching checking for condition of the operative area was realized by way dynamic USD and KT each 3 month during 1 observations and each 6 months at the following years.

The frequency of recurrence of the patients without chemotherapy has formed 9.7% ( $n=20$ ). Patients after prophylactic chemotherapy recurrences noted only in 3 (0.9%) events. In rest observations ( $n=303$ ) after holding courses to postoperative chemotherapy at periods of the observation from 1 year till 5 years of the recurrence disease is not noted.

It was hold analyses interaction to localizations of recurrence's sac with revenge of the primary defeat beside 23 sick persons with repeated echinococcosis. In this case a localization of recurrence's sac only 26% sicks has complied with segmentary localization primary sac, that has allowed to exclude absolute dominance in the role fibrous capsule of recurrence's genesis at the current diseases.

Probability of the development of the recidivation, possibly is connected with that, that primary defeat of liver initially could

be plural, but development only one parasitival of the sac is connected with its dominance, competitive suppressing growing of the rest sacs.

#### Conclusion

The primary operation on cause of the liver echinococcosis without supporting phylactic chemotherapy, held on in condition of the modern high-tech surgical institution, does not guarantee from recidivation of the disease.

Using antirecidivation to chemotherapies at postoperative period derived benzimidazole carbamates (albendazole) allows to lead minimum frequency of recidivation to the diseases.

Reading to uses of curable isolated to chemotherapy by the liver echinococcosis, strictly connected with area of the primary localization parasitic sac, has formed 26.0% from all recidivation of the forms. The big share echinococcosis recidivation of the sac in removed from primary centre segment (56.5%) and even defeat of the other share (17.5%) call in question role of the fiber capsule of the primary sac as the main factor of the relapse of the disease.

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## Osteosynthesis of external fixation of open fractures of the lower limbs

**Abstract:** It is proposed to improve the methodology of external fixation of long bones by optimizing layouts for different devices according to the nature and localization of open fractures of the lower limbs.

Application of the developed devices in patients with severe open fractures of long bones creates a convenience for those affected, significantly reduces the time of the operation, there is no alternative is unilateral arrangement of the device for combined injury.

**Keywords:** Fractures of the long bones femur, tibia, external fixation devices, early activation, less invasive osteosynthesis techniques.

#### Introduction

Treatment of open fractures of long bones in combined injury is very serious current problem of modern traumatology due to large damage such high mortality in the acute period of traumatic disease. Open fractures of the tibia is occupied by 54.3 to 78% of all extremity fractures (Bialik E. I., 2002, Valiev E. Y., 2002).

To stabilize the bone fragments in such cases you should use the most simple design — monolateral rod apparatus with a support in the form of beams and brackets kit external osteosynthesis by Ilizarov (Beidik E. I., 2009, Gorodnichenko A. I., 2000).

When such injuries often arise suppurative complications, reaching 57.4%, not great adhesions, false joints and bone defects resulting from the treatment and lead to disability (Martel I. I., 2012, Shved S. I., 2000).

Aim — improvement of results of treatment of patients with lower limb bone open fractures by improving methods of external

fixation by optimizing layouts for different devices according to the nature and location of lower limb fractures.

#### Materials and methods

We have developed a number of new arrangements of devices for osteosynthesis of long bones on the basis of common in many regions of the CIS structures Ilizarov.

#### I. The core unit (FAP № 200100007 from 15.01.2010)

Scheme of rod apparatus from parts of Ilizarov apparatus is shown in fig. 1.

Apparatus for the treatment of fractures of long bones comprising bone pins (1), nut (2), the threaded rods (3) arranged in parallel to each other and connected semi frames (4), wherein on the screw rods mounted plate 5 and semi frames with holes (4), which are fixed on the screw rods via clamping screws (2), moreover plate semi frames (5) and (4) are equipped with clamps for bone rods (6).



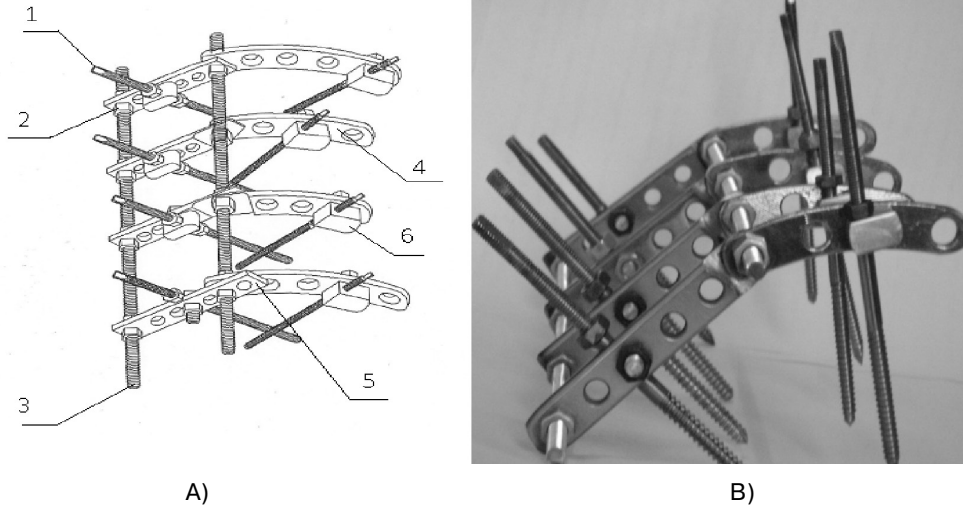


Fig. 1. Scheme of rod apparatus from parts of Ilizarov apparatus

**Description of methods osteosynthesis with rod apparatus**

**Indications and contraindications**

Indications: open and closed fractures of the long bones of the lower extremities. Open fractures with damage to the vascular nerve bundle.

Contraindications: generalized cancer; acute psychosis, senile dementia; decompensated state of the cardiovascular and respiratory systems (to the relief of these phenomena).

**Preoperative preparation**

Running radiography in two mutually projections: external osteosynthesis method should not be used in the absence of all the necessary for his organizational and technical conditions and trained personnel.

**Anesthesia**

The choice of method of anesthesia due to the weight of the affected state, view extraskelatal damage associated trauma, the presence and severity of the shock, the magnitude of blood loss and the state of anesthesia for hemodinamics. Optimal view external osteosynthesis of shin is block anesthesia. Patients in the compensated state. In more serious cases, including with severe concomitant injury, when along with the tibia osteosynthesis performed other surgical intervention is appropriate anesthesia with artificial lung ventilation.

The core unit for the treatment of long bone fractures is used as follows. surgery technique is fairly simple and safe in the sense that virtually no risk of damage to the neurovascular trunks.

The operation is performed as follows: after the removal of coarse mixings of bone fragments, the device is assembled is applied to the damaged segment, determine the area of administration of rods in the central and distal fragments. In each of the fragments of bone threaded rods 1 to the anterior-internal surface of the tibia. The rods to reinforce the strips 5 and 4 with semiframes bone winding rods 6. screw nut 2 to 3 bars provide the necessary compression or distraction of bone fragments. Rotary mixing eliminates moving rods on holes 1 semiframes 4. Produce radiographs. The device is removed after 3 months. The device convenient and easy to use. It is recommended for wide use in practical medicine.

**II. The core unit (FAP № 20011.0033 from 05.05.11)**

Scheme of rod apparatus from parts of Ilizarov apparatus is shown in fig. 2. Wire rod apparatus for treating fractures of long bones used contains 2 half-ring (1) and two Ilizarov apparatus strap from Ilizarov frame element (2) which is helical coupler (10) as the outer support. Transosseous retainers are spokes (3) and rods (4) of different diameters from 4 to 6 mm., each bone screw driving rod has a part (5) and the cylinder (6) with a key shank (7). Connecting element between the outer bearing, needle and rod are wire clamps (8) and rodclamps (9) to secure the hard core, which is free to move to the other strap hole. The means for relative movement between the rods and bone needles in the form of the turnbuckle. Bone pins (4) and spokes (3) and that serves to half-rings in the horizontal bar, and bone pins and half-rings of radial spokes form an angle of approximately 90°.

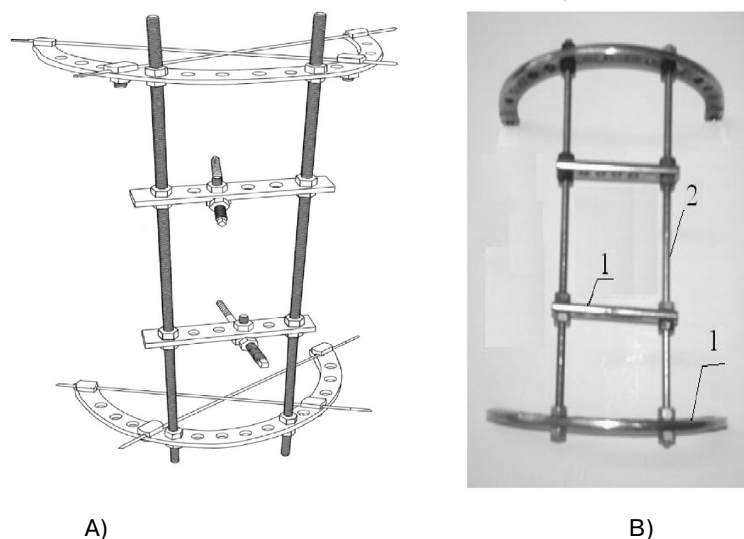


Fig. 2. Scheme of rod apparatus from parts of Ilizarov apparatus

Designed stem cell phones awarded the innovation and application of the grant of the State Committee of Science and Technology. And the number 36 from 02.01.2009, the number 23 from 02.01.2009 and of operative treatment for fractures of the long bones and the spine Manufacturing production batch of machines and devices, number of state. Registration — To-K-11-009 (2008–2010).

The work is based on the analysis of the results of treatment of 40 patients with open fractures of the lower limb between the ages of 15 and 80 years, who underwent surgical treatment by external osteosynthesis acute injury to the department Research Institute of Traumatology and Orthopaedics, Ministry of Health of the Republic of Uzbekistan.

From 2010 to 2014, in our clinic we made 84 operations in 40 patients with multiple and associated trauma. osteosynthesis of the femur and tibia by external osteosynthesis rod device.

Open fractures of the femur and tibia in road accidents occurred as a direct result of the mechanism of injury and damage accompanied by not only the bones but also soft tissues. According to the classification A. V. Kaplana and O. N. Markovoy majority (68–60.7%) fractures consistent with the type B, preferably (100–89.3%) lower leg fractures most often traumatic brain injury occurred among the collateral damage — in 78 (35.5%) of 40 patients.

Spine fracture were 18 (8.2%) patients, the fracture of the humerus — 16 (7.3%), fracture of the heel bone — 14 (6.4), fractures of the pelvis — 12 (5.5%), fracture of the forearm bones — 10 (4.5%) – 8 multiple rib fractures (3.6%), patellar fracture — 8 (3.6%), fracture of the clavicle — 6 (2.7%) patients.

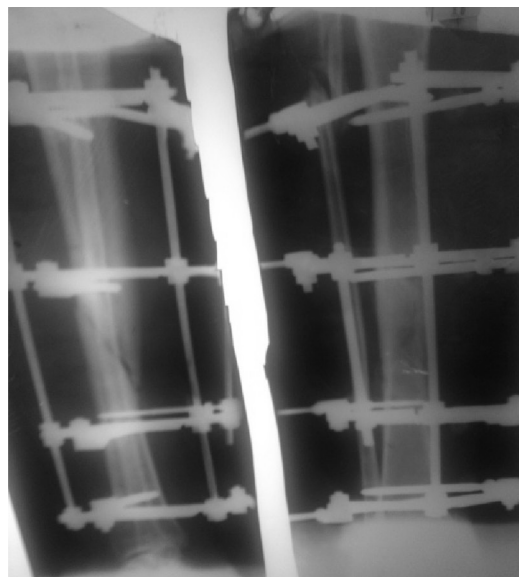


Fig. 3. Radiographs of the patient before operation

#### **Clinical case 2 (fig. 4)**

Patient: 54 years old.

Diagnosis: Open fractures of the upper third in the left tibial bone with a mix of bone fragments, the I–II degree of traumatic shock.

The patient of 54 years old had open fracture of the shin bones in the upper third of diaphyseal part at home due to kick shin. AT admission to the clinic the osteosynthesis with wires and rods was performed. The patient was discharged on the 7 day after operation. The wound was healed by first intention. The rod apparatus was removed three months after operation. The total period of apparatus application was 3 months.

#### **Conclusion**

1. In cases of severe open fractures in the patients with multiple trauma in the acute period there is no alternative

Fixation of bone fragments rod apparatus with open fractures in patients with multiple trauma held in the acute period, and the final fixation in a delayed manner after removal from the victim of traumatic shock.

All patients were divided into 2 groups according to the method applied to them external osteosynthesis follows:

I — spoke osteosynthesis – 40;

II — rod osteosynthesis – 28.

#### **Results**

The results of treatment were observed in 28 patients during the follow-up period from 8 to 20 months. The short-term results in all the operated patients were good, complications were not found. The development of movements in the contiguous joints began on the 4–5 days after operation. In the long-term period the union of the fractures with restoration of the extremity function was achieved in all the patients.

#### **Clinical case 1 (fig. 3)**

Patients: 48 years old.

Diagnosis: Open fractures of the middle third of the left tibial bone with a mix of bone fragments, the I–II degree of traumatic shock.

After performance of the anti-shock measures in the early post-traumatic shock period the osteosynthesis surgery with rod apparatus was made.

The patient was discharged from hospital on the 6 day after operation. The rod apparatus was removed three months later. The total term of hospital staying was 3 months.

to the apparatus of the external fixation with use of rod and wires.

2. The constructs of the apparatus of external fixation with using of rod and wires allow wound examination and dressing requiring in severe open fractures.
3. Mechanical strength equipment design allows early loading of the damaged segment and the early development of the joints can improve the functional and anatomical results.
4. The core devices described in this manual, it is enough available for specialized trauma care. For their application does not require the purchase of additional instruments, since only a set of parts used for osteosynthesis by Ilizarov, who are almost universally.

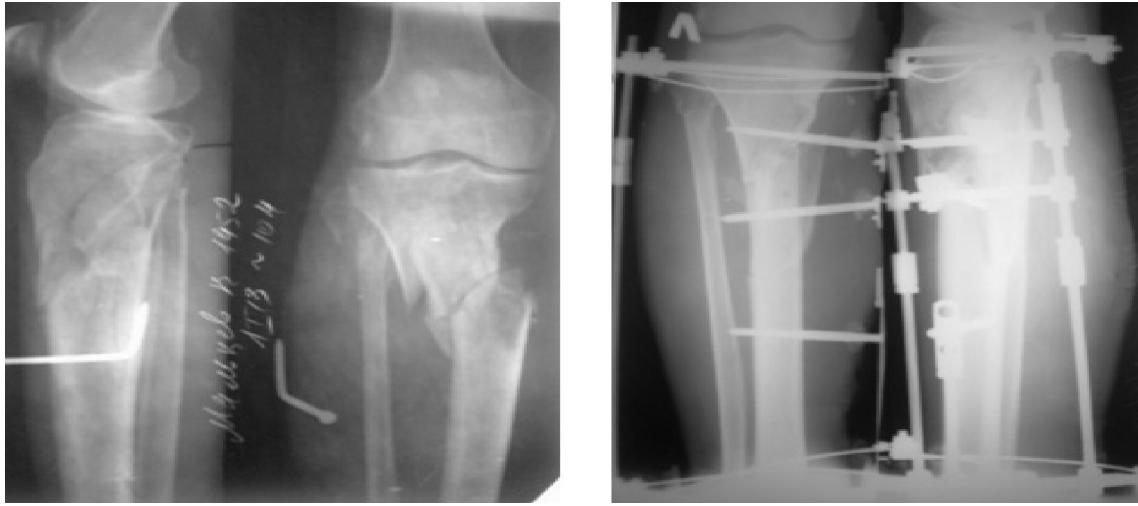


Fig. 4. Radiographs of the patient before operation

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## Role of oxidative process in pathogenesis of oral lichen planus

**Abstract:** Imbalance between free radical oxidation and anti-oxidant system is one of the key links of development of lichen planus on oral mucosa. Data on evaluation of anti-oxidant system (AOS) and peroxidation of lipids (POL), degree of imbalance between pro- and anti-oxidants in biological substratum (blood, oral liquid) are sensitive and objective indices of severity of pathologic processes on oral mucosa, that proves use of antioxidants in complex treatment of oral lichen planus (OLP) as local and system cure.

**Keywords:** lichen planus, oral liquid, lipid peroxidation, anti-oxidant system, diene conjugates, trienoic conjugates, malonic conjugates, catalase, superoxide dismutase, glutathione peroxidase.

Lichen planus (LP) is inflammatory, immune dependant disease of skin and oral mucosa, which is characterized by chronic polymorbid clinical current, torpidity to traditional therapy ad polymorphism of clinical manifestation [4, 3–4; 5, 267; 6, 57–58; 7, 11; 9, 55–57; 10, 7–8; 11, 300–301; 16, 683–684].

It should be noted, that OLP often has severe clinical current, at the same time one form could transform into another one, and malignancy frequency is equal to 6–7% [13, 682; 15, 458–459].

Nowadays there is no doubt that pathogenesis of OLP is germane to development of oxidative stress, which can become the

reason of immune insufficiency and can cause chronic pathologic process [3, 106–107; 6, 58; 12, 355–357; 14, 311].

In spite of large number of studies in this field, questions of state of POL-AOS in patients with the different clinical forms of OLP remain uncertain, the importance of clinical research of state of this mechanisms on local “oral liquid” and system “blood” levels has not been established till the end.

In view of aforesaid the purpose of research is to study processes of free radical oxidation (FRO) of oral liquid and blood serum in patients with different clinical forms of OLP.

### Material and methods

107 patients with exacerbation of OLP, including 27 patients with typical form, 34 patients with exudative-hyperemic form, 32 patients with erosive-ulcerous form and 14 patients with bullous form, were examined. Control group was presented 20 patients of commensurable gender and age, without diseases of skin and oral mucosa. Compared groups were randomized by gender and age, which provided representativeness of received data.

The level of POL processes was evaluated on consistence of diene conjugates (DC) as primary products of lipid peroxidation, trienoic conjugates (TC) and malonic conjugates (MC) as secondary products and Schiff bases (SB) as final product. Content of DC, TC and SB was estimated as correlation of transmission density of lipid extracts accordingly E232/E220; E278/E220 and E400/E220 and evaluated in conventional units, isopropanole fraction was considered. MDA concentration was evaluated by spectrophotometric method in test with thiobarbituric acid (Konyukhova V. S., 1989).

State of AOS processes was estimated on activity of antioxidant enzymes, such as catalase (CT) (Korolyuk M. A. et al 1988); superoxide dismutase (SOD) (Nishikimi N. et al., 1972); glutathione peroxidase (GP) (B. Paglia, W. Walentine, 1967); and activity of succinate dehydrogenase (SuDH) (Storozhuk P. G. and Storozhuk A. P., 2003).

Statistical treatment was carried out on personal computer with the use of «Microsoft Excel» program, we estimate mean value  $M$ , standard error of mean value- $m$ ; reliability of differences was evaluated on the base of  $t$ , Student criterion.

### Results and discussion

It is established from data analysis that chronic inflammatory process on oral mucosa is characterized by apparent activity of POL processes and exhaustion of endogenous anti-oxidant potential. In comparing of activity of studied processes higher values of studied indices were noted in oral liquid, which reflected activity of local process on mucous membranes, and higher activity of metabolic processes in oral cavity.

The increase of concentrations of studied POL processes progressively growing with the increase of severity of pathologic process was registered in oral liquid and in blood serum.

Thus, in oral liquid DC concentration was increased on 37.73% ( $P < 0.01$ ) in typical form of OLP; 83.36% ( $P < 0.001$ ) in exudative-hyperemic form; 119.09% ( $P < 0.001$ ) in erosive-ulcerous and 112.73% ( $P < 0.001$ ) in bullous form; corresponding dynamics of TC and MDA were equal to 23.81% ( $P < 0.01$ ) and 46.95% ( $P < 0.01$ ); 78.54% ( $P < 0.01$ ) — 83.33% ( $P < 0.01$ ); 151.25% ( $P < 0.001$ ) and 109.62% ( $P < 0.01$ ) and 175.61% ( $P < 0.001$ ) — 111.50%

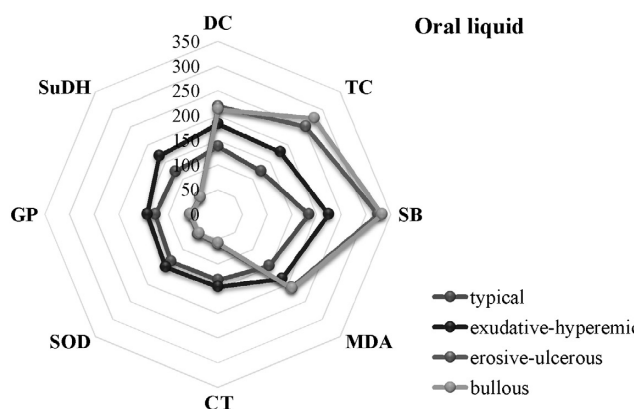


Fig. 1. Indices of intensity of POL processes and AOS activity in oral liquid in patients with OLP ( $M \pm m$ )

( $P < 0.001$ ); and SB was on 84.0% ( $P < 0.01$ ); 124.0% ( $P < 0.01$ ); 224.0% ( $P < 0.01$ ) and 232.0% ( $P < 0.01$ ) correspondingly (fig. 1).

Increase of POL processes on system level (blood serum) was less expressed. Thus in typical form of OLP level of DC was increased on 17.90% ( $P < 0.05$ ) concerning control one; TC and MDA were on 17.87% ( $P < 0.05$ ) and 36.65% ( $P < 0.05$ ); and SB was on 75.0% ( $P < 0.001$ ); corresponding correlation in erosive-ulcerous form were 72.90% ( $P < 0.01$ ); 85.71% ( $P < 0.001$ ); 73.58% ( $P < 0.01$ ) and 125.0% ( $P < 0.001$ ); in bullous form they were 80.52% ( $P < 0.01$ ); 93.21% ( $P < 0.001$ ); 76.42% ( $P < 0.01$ ) and 112.5% ( $P < 0.01$ ) correspondingly (fig. 2).

Stable increase of DC concentration as product of early response is an evidence of constant maintaining increased activity of POL processes caused by pathologic process, and also of stable "infected" of humoral environment of organism with fresh products of this type of metabolism

Changes of other indices of POL, such as TC and MDA level (intermediate product of POL), SB concentration (products of late response) less reflect activity of process characterizing involvement of different morphologic structures, cell membranes first of all, in lipid peroxidation.

In research of endogenous anti-oxidant potential asynchrony of activity of AOS enzymes was stated, clear increase of enzyme activity in biologic environment in typical and exudative-hyperemic forms changed into its decrease in patients with erosive-ulcerous and bullous forms.

Thus, in patients with typical form of OLP CT activity was increased on 32.61% ( $P < 0.05$ ); SOD was on 34.74% ( $P < 0.01$ ); GP was on 26.51% ( $P < 0.05$ ); and SuDH was on 22.21% ( $P < 0.05$ ); corresponding dynamics in exudative-hyperemic form was equal to 45.95% ( $P < 0.01$ ); 50.0% ( $P < 0.01$ ); 43.06% ( $P < 0.01$ ) and 67.40% ( $P < 0.01$ ); decrease of AOS enzyme activity in erosive-ulcerous form was 39.55% ( $P < 0.01$ ); 42.45% ( $P < 0.01$ ); 42.88% ( $P < 0.01$ ) and 48.75% ( $P < 0.01$ ); in bullous form it was 42.75% ( $P < 0.01$ ); 46.37% ( $P < 0.01$ ); 43.68% ( $P < 0.01$ ) and 49.67% ( $P < 0.01$ ) correspondingly (fig. 1).

Similar dynamics of AOS enzymes in blood serum were presented: in typical and exudative-hyperemic forms as increase: CT was on 20.0% ( $P < 0.05$ ) and 35.45% ( $P < 0.05$ ); SOD was on 20.0% ( $P < 0.05$ ) and 39.24% ( $P < 0.05$ ); GP was 16.0% ( $P < 0.05$ ) and 22.02% ( $P < 0.05$ ) and SuDH was on 13.18% ( $P > 0.01$ ) and 18.62% ( $P < 0.05$ ); in erosive-ulcerous and bullous forms corresponding decrease was on 31.33% ( $P < 0.01$ ) and 44.87% ( $P < 0.01$ ); 33.14% ( $P < 0.01$ ) and 38.1% ( $P < 0.01$ ); 27.8% ( $P < 0.05$ ) and 33.73% ( $P < 0.01$ ); 23.35% ( $P < 0.01$ ) and 25.65% ( $P < 0.01$ ) (Fig. 2).

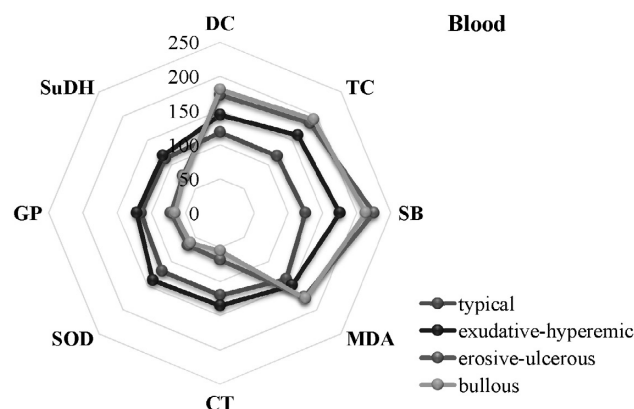


Fig. 2. The indices of intensity of POL processes and AOS activity in blood of patients with OLP ( $M \pm m$ )

Reaction of free radical oxidation is initiated with active form of oxygen leading to chemical modification and destruction of bio molecules. In conditions of oxidative stress and intensive formation of active forms of oxygen disturbance of functioning of antioxidant enzymes occurs.

Catalase (CT) is enzyme of oxidoreductase class, included in cell antioxidant system content and realizing function of anti-peroxide protection ( $H_2O_2$ ); glutathione peroxidase (GP) is catalyst for reducing reaction of hydrogen peroxide ( $H_2O_2$ ) lipid hydro-peroxide (ROOH); superoxide dismutase (SOD) realizes catalysis of recombination reaction of superoxide anions ( $O_2^-$ ); succinate dehydrogenase (SuDH) is enzyme of oxidoreductase class, it is localized in inner membrane of mitochondria and is one of important enzymes of energetic exchange, catalyzes reversible oxidation of succinate to fumaric acid in Krebs cycle of tricarboxylic acids. Oxidation of 1 mole of succinate leads to synthesis of 2 moles of adenosine triphosphate (ATP). Electrons from succinate dehydrogenase are sent to respiratory chain on coenzyme Q. Decrease of SuDH activity reflects decrease of cell endotransport respiratory chain [8, 14–15].

Quantitative characteristics of main energetic process in mitochondria, which is oxidation of succinate (OSA) and its signal operation characterize intensity of sympathetic (adrenergic) regulation in organism. OSA with SuDH is the most potent process of energy saving, which affects physiologic state of organism. SuDH activity as mitochondria enzyme is an important index of connection of physiologic state and mitochondrial processes [1, 220; 2, 29–30]. Decrease of SuDH activity in patients with erosive-ulcerous and bullous forms of OLP is evidence of need of reducing energetic mitochondrial processes medicines in complex treatment.

Thus, existed changes characterize different on direction, but compelled shifts in both links of prooxidant-antioxidant system

illustrating intensive imbalance. Increase of POL products concentration reflecting growth of FRO intensity contributes to faster exhaustion of bio antioxidant supplies and reduction of system redox potential. In this case peculiar “vicious circle” is formed, when every previous stage starts following one, and probability of state reversibility and normalization gradually decreases till minimum. Results unambiguously confirm that generalization and intensity growth of OLP cause gradual exhaustion of physiologic supply of bio antioxidants. Relative increase of AOS enzymes in patients with typical and exudative-hyperemic forms lets to consider volume increase of protective physiologic antioxidant systems for regulation of POL processes. In change to bullous and erosive-ulcerous forms “qualitative leap” occurs, when reserve power of antioxidant system is not enough for compensation of increased POL processes, stimuli correlation changes toward pro-oxidant agents and oxidative destruction contributes to developed pathologic process on oral mucosa.

Imbalance of homeostasis manifests with emaciation and frustration of antioxidants of direct action eliminating free radicals and enzymes of cell energetic supply having direct and indirect effects.

Thus, imbalance between free radicals peroxidation and AOS is one of the key links of development of OLP.

Data on evaluation of POL-AOS processes, shift degree between pro- and anti-oxidants in biological substrates (blood, oral liquid) are sensitive and objective indices of severity of pathologic process on oral mucosa, substantiating need of antioxidants in complex treatment of OLP as local and system cure.

Increase of cell energetic potential, which allows to maintain energosynthetic function of mitochondria in condition of progressive hypoxia, should be considered as perspective way.

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## Antiviral treatment of patients with liver cirrhosis of viral etiology (HCV–infection)

**Abstract:** The article analyzes the results of combination antiviral therapy in 100 patients with compensated liver cirrhosis (LC) caused by chronic HCV-infection. The duration of combination antiviral therapy (KPVT) was 24 or 48 weeks depending on the genotype of HCV. KPVT was discontinued due to ineffectiveness and/or the development of serious complications in almost 20% of patients with liver cirrhosis. Although the overall efficiency of KPVT was lower than the figures usually recorded in chronic viral hepatitis C (HCV) without the presence of liver cirrhosis, as a whole the percentage of sustained virologic response (SVR) when the CPU was quite high and amounted to 46.2%. KPVT efficiency was higher in patients with cirrhosis caused by genotype 3a HCV, as compared to the genotype 1b HCV. SVR was observed in this group, 52.3% of patients compared with 40.8% of patients infected by genotype 1b. Relapses with HCV genotype 3a met, on the other hand, slightly less (31.8% vs. 36.7%). Despite the lower efficiency and a higher percentage of complications, should be recognized KPVT in patients with compensated cirrhosis etiology of liver HCV-appropriate.

**Keywords:** ribavirin, pegylated interferon, antiviral therapy, liver cirrhosis, chronic viral hepatitis.

### Relevance

In a world of 170 to 300 million people are infected with the hepatitis C virus. [5] As frequency hepatitis C virus is one of the first places among all infections transmitted through the blood [3; 4; 10]. Chronic hepatitis C virus (HCV) includes complications such as liver cirrhosis, hepatocellular carcinoma and liver failure [2, 4]. Approximately 25% of all cases of cirrhosis and hepatocellular carcinoma develop due to chronic hepatitis C [2–4; 8; 10]. The most common cause of liver transplants in the world are severe liver damage resulting from chronic HCV. It is known that the frequency of HCV-infection serious complications increases due to slow disease progression [2; 8].

According to scientific literature, patients with liver fibrosis, cirrhosis, and especially in the greatest need of antiviral therapy, but the effectiveness of the treatment, which is estimated sustained virological response (SVR) is sufficiently low — approximately 30% [1–4; 7; 9]. However, achieving SVR in these patients can significantly reduce the incidence of decompensated liver disease, complications and death [2; 6].

In connection with this important improvement in “difficult” antiviral therapy results in this patient group [2]. Consequently, information on the effectiveness of antiviral therapy of patients with viral cirrhosis very small.

### Purpose of the study

Determination of the effectiveness of combined antiviral therapy (HTP) patients with cirrhosis of viral etiology (HCV) infection.

### Materials and methods

During the period of 2007–2011, based BUZ “Regional Clinical Hospital of Infectious Diseases” of Voronezh were examined and treated 100 patients aged from 32 years to 58 years (56 males, 44 females) with a diagnosis of “cirrhosis of viral etiology (HCV) infection, compensation stage (Class A on the Child-Pugh). The diagnosis was established traditionally, according to generally accepted standards. Etiological diagnosis verification carried out based on the detection of serum HCV RNA by polymerase chain reaction (PCR). PCR diagnostics was carried out in real-time mode, the sensitivity of the test systems used (HCV RNA AmpliSens) was 50 copies/mL. All the patients underwent genotyping HCV. The most often detected genotype 1b infection — in 49 patients (49.0%), genotype 3a met in 44 (44.0%) patients. If necessary, carried out in patients with HCV RNA quantification in

blood. serum markers (a-HCV–IgG, and-HCV–IgM) were also determined using an enzyme immunoassay (EIA).

The diagnosis of liver cirrhosis (LC) was based on the ultrasound data of the abdominal cavity, where the signs of portal hypertension, such as splenomegaly and expansion of the portal vein were detected. Also, all patients underwent endoscopy, which determines the dilated veins of the esophagus I–II degree. In all patients, the diagnosis was confirmed by the CPU via fibroelastometrii liver tissue Fibroscan FS-502 apparatus (Echosens, France) with the identification stage F4 fibrosis by Metavir scale. Besides this, 20.4% of patients (19 persons) additionally hepatic biopsy by Mengini with morphological confirmation of the diagnosis of the CPU (F3-F4 on the Knodell) was carried out.

In addition to general clinical methods of examination, all patients performed a full serological examination for markers of viral hepatitis B, D, using ELISA and molecular diagnostics (PCR) was carried out determining the content of  $\alpha$ -fetoprotein concentrations of iron and copper in the blood serum. Prior to the OEM serology ruled out the presence of autoimmune hepatitis and other autoimmune conditions.

Inclusion criteria were:

- A positive test for a-HCV–IgG, and-HCV–IgM;
- A positive analysis of HCV RNA PCR;
- An increased level of serum ALT;
- The results of liver biopsy and fibroelastometr, confirming the diagnosis of cirrhosis of the liver;
- The severity of liver cirrhosis on the scale of Child-Turcotte-Pugh < 7 points.

Except for the criteria adopted:

- The patient's age (under 18 and over 65 years);
- Companion of HBV infection and HIV infection;
- The presence of concomitant liver disease (primary biliary cirrhosis, Wilson's disease, Budd-Chiari syndrome, hemochromatosis, autoimmune hepatitis, deficiency alpha-1 antitrypsin), or any disease of the liver in the stage of decompensation;
- Regular consumption of alcohol of more than 50 g/day in men and 25g/day for women in the last two years before the start of the OEM;
- The presence of previous antiviral treatment for HCV;
- The presence of any of the commonly accepted contraindications for OEM (severe thrombocytopenia less than  $65 \times 10^9/L$ , neutrophil count less than  $1.5 \times 10^9/L$ , severe heart disease,

uncontrolled diabetes, autoimmune disorders, hemoglobin less than 80 g/l; increased creatinine above normal; a history of or existing at the time of the survey depression or mental disorders);

– The severity of liver cirrhosis on the scale of Child-Turcotte-Pugh score 7 or greater.

All 100 patients were naive on HTP (previously none of them had received antiviral therapy for chronic hepatitis C). In all patients combined PVT was conducted. Patients received pegylated interferon alfa-2b (PegIntron) 120 mg, 1 once a week subcutaneously, or pegylated interferon alfa-2a (Pegasys) 180 mg, 1 time per week subcutaneously. Both regimens included in the complex therapy of ribavirin, which is administered in a daily dose of 1000 mg, for patients weighing < 75 kg, or 1200 mg/day of patient body weight at ≥ 75 kg, orally in two divided doses. The duration of therapy was 24 weeks in patients infected with genotype 3a HCV-infection, and 48 weeks for patients infected with genotype 1b HCV-infection.

Achievement of SVR was assessed as the final indicator of the effectiveness of therapy. SVR — undetectable levels of HCV RNA in the serum 24 weeks after discontinuation of therapy [3].

All patients were randomized study groups on key clinical and laboratory parameters and body weight. In all the samples we tested the hypothesis of normality of distribution by Kolmogorov-Smirnov. To assess the reliability of the sample differences using nonparametric Mann-Whitney. All differences were considered significant at a value of  $P < 0.05$ .

Statistical analysis was performed using a standard Statistica for Windows software (version 13.0) from Statsoft Inc.

### Results

In the course of antiviral therapy in 18 (18.0%) patients with a diagnosis of “cirrhosis of viral etiology (HCV) infection, stage of compensation”, the treatment was stopped early for the following reasons:

- Lack of virologic response (10 patients);
- Developed in the course of treatment adverse reactions (8 patients), such as the expression of flu-like symptoms, anemia, leukopenia, thrombocytopenia.

The absence of response to therapy often recorded in patients infected with genotype 1b HCV-infection — 11 (22.5%) patients than in patients infected with genotype 3a HCV-infection — 7 (15.9%) patients.

Full OEM course completed 75 patients. Thus, in the total group of patients with CKD treated with HTP, SVR was recorded in 43 (46.2%) patients, relapses were observed among the 32 (34.4%) patients.

Analyzing the results of the OEM, depending on the HCV genotype, we obtained the following data. Patients infected with genotype 1b HCV, SVR recorded in 40.8% of cases, relapse occurred in 36.7% of patients. In patients infected with the HCV genotype 3a, SVR was recorded in 52.3% of cases, relapses were observed in 31.8% of patients.

Thus, among patients observed SVR was significantly higher in patients infected with genotype 3a HCV (52.3%), compared to genotype 1b (40.8%,  $P < 0.05$ ). However, relapse rates for genotype 1b was slightly higher (36.7% vs. 31.8%,  $P > 0.05$ ).

### Conclusions

Thus, the combined antiviral therapy is effective in patients with cirrhosis of viral etiology (HCV) infection. SVR in these patients in the future will allow to significantly reduce the frequency of decompensated liver disease, and hence the development of hepatocellular carcinoma.

Quite a high percentage of patients with genotype 1b, 3a and showed relapse after completion KPVT that is probably due to fibrosis of the liver, impairing effects of antiviral drugs and processes sanogenesis.

According to the findings, the optimal candidates for antiviral therapy are patients with compensated cirrhosis (Class A according to Child-Pugh) and not infected with genotype 1 HCV infection.

However, antiviral therapy is indicated in all patients with compensated HCV cirrhosis irrespective of achieving a sustained virologic response, because it reduces the rate of progression of the disease and the level of viremia.

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## Clinical and laboratory characteristics of rotavirus gastroenteritis in children in Tashkent-city

**Abstract:** The article presents the clinical and laboratory findings of children with rotavirus gastroenteritis. It was found in the majority of cases, children with gastroenteritis received in the hospital for 2–3 days of the disease, and they have mostly recorded a severe form of the disease. RVGE in children starts with vomiting from the first day of the disease. Vomiting accompanied by diarrhea, diarrhea was mainly the secretory nature rarely observed invasive diarrhea. Changes in koprogramms of children with RVGE was characterized with moderate and excessive presence of mucus in the feces, moderate and excessive presence of neutral fats. Routine blood test indicators in children with RVI prevailed decrease white blood cell count, and in some cases — reducing the level of hemoglobin. Also, we examined children leukopenia, which, in our opinion, is due to a viral etiology of the disease. Moreover, these values were recorded in children with severe forms of the disease and, accordingly, a high level of virus replication. In most cases, leukocytes values were within normal limits.

**Keywords:** rotavirus, gastroenteritis, children.

In recent years, domination of virus agents in acute intestinal infection (AII) morbidity has been observed worldwide; about 70 % of acute diarrhea cases are caused by them [1].

The major etiologic agent of acute gastroenteritis in infants both in developing [5; 6] and developed countries [4] is rotaviruses.

According to the WHO data, almost every child within the first five years of his life suffers from rotavirus gastroenteritis irrespective of the race and social or economic status. Nearly 125 million cases of rotavirus infections are registered globally every year, of which 600–900 thousand come to the end lethally, that makes almost one quarter of all fatal cases among patients with diarrhea [2; 3; 4]. Thereupon, studying early and pathognomonic symptoms as well as the characteristic changes in laboratory indicators in rotavirus infections in children is of highly practical importance for timely diagnosis of the disease and, accordingly, carrying out corresponding medical interventions.

**Research objective:** study clinical and laboratory features of rotavirus gastroenteritis in children.

### Material and research methods

We have examined 671 children with acute diarrhea and analyzed the information from the medical histories. All the patients were admitted to city clinical infectious hospital No 4 in Tashkent (Uzbekistan), they have been treated during the period from 2011 (November–December) till 2012 (January–February).

The diagnosis of “rotavirus gastroenteritis” (RVGE) was made on the basis of epidemiological anamnesis coupled with the clinical semiology that is characteristic for RVGE under the condition of obligatory detection of the rotavirus antigen in the feces by the enzyme multiplied immunoassay (ELISA) made in the virological laboratory of the Center for Sanitary-and-Epidemiologic Surveillance in Tashkent.

### Results and discussion

Among 671 children hospitalized in the fall-winter period, the “rotavirus gastroenteritis” diagnosis was made to 209 children that made 31.1 % from all children examined to reveal the viruses.

The sex distribution of the RVGE patients was as follows: boys — 58.8 % (123 children), girls — 41.2 % (86 children). The age structure of the children was analyzed: the babies at the age from 0 till 6 months made 8.7 % (18 babies), from 6 months till 1 year — 16.5 % (35 infants), from 1 till 2 years — 42.5 % (89 infants), from

2 till 3 years — 18.7 % (39 infants), elder than 3 years — 13.4 % (28 children). Among the patients, the organized (visiting day-nurseries) children made 46.8 % (98 children), unorganized gave 53.1 % — (111 children).

In the epidemiologic past history of the hospitalized patients, such factors as contacts with AII patients (33 patients — 15.8 %), contacts with patients with some respiratory infection (20 patient — 9.5 %), no known cause (31 patients — 14.8 %) and wrong nutrition (125 children — 59.8 %) prevailed. The patients have been admitted to the hospital: at day 1 of the illness — 19 children (9 %), day 2, 3 — 156 children (74.6 %), day 4 and later — 34 children (16.4 %). The average duration of children treatment in the hospital made  $3.8 \pm 0.7$  days.

The RVGE patients had the following forms of the disease: severe form — 146 children (69.9 %), moderate — 63 children (30.1 %). Mild forms were not registered.

The observed children had some accompanying diseases: acute respiratory virus infection — 19 children (9 %), rickets — 34 children (16 %), anemia — 66 children (31.1 %).

We have analyzed the clinical symptoms of rotavirus gastroenteritis in children in the dynamics of the disease development. The obtained findings are presented in Table 1.

As the table shows, in the RVGE children, the characteristic manifestations were intoxication symptoms, dyspepsia events. The fact that from the beginning of the disease 33 % of children showed catarrhal events in the form of cold, pains in the throat, cough comes under notice. It can be used as a diagnostic criterion to differentiate RVGE from gastroenteritis of other etiology. Vomiting and diarrhea were observed in less than half of the children (40.5 % and 44.5 %, accordingly). One third of patients had tympanism which is one of characteristic signs of viral diarrhea. Approximately by day 4–5 of the disease the clinical semiology abated.

The children were brought to the hospital with clinical symptoms in different combinations (fever-diarrhea, diarrhea-vomiting, etc.) or with one of them.

The next stage of the research was studying the changes in general clinical laboratory indicators to reveal typical RVGE manifestations. The changes in the findings of feces analysis are shown in Table 2.



Table 1. – RVGE clinical manifestations in the disease dynamics

Major symptoms	Days of the disease (number of patients – 209)						No symptoms
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	
	Abs (%)	Abs (%)	Abs (%)	Abs (%)	Abs (%)	Abs (%)	Abs (%)
Fever	79 (37.8)	67 (32.0)	28 (13.4)	5 (2.4)	3 (1.4)	2 (0.95)	25 (11.9)
Lack of appetite	97 (46.4)	70 (33.5)	32 (15.3)	5 (2.4)	3 (1.4)	2 (0.95)	0
Nausea	71 (34.0)	65 (31.1)	39 (18.6)	18 (8.6)	4 (1.9)	0	12 (5.7)
Vomiting	84 (40.5)	70 (33.5)	35 (16.7)	18 (8.6)	0	0	2 (0.95)
Diarrhea	93 (44.5)	49 (23.4)	43 (20.5)	22 (10.5)	0	0	2 (0.95)
Tympanism	65 (31.1)	43 (20.5)	38 (18.1)	28 (13.4)	23 (11.0)	12 (5.7)	0
Catarrhal events	69 (33.0)	47 (22.5)	28 (13.4)	15 (7.2)	2 (0.95)	0	48 (22.9)

Table 2. – Feces analysis indicators in RVGE children

Indicators	RVGE children (n = 209)	
	abs.	%
<b>Presence of mucus in feces:</b>		
Not present	24	11.5
Slightly	60	28.7
Moderately	89	42.6
Excessively	36	17.2
<b>Presence of neutral fats in feces:</b>		
Not present	13	6.2
Slightly	71	33.9
Moderately	107	51.2
Excessively	18	8.6
<b>Feces color:</b>		
physiological	12	5.7
Green	125	59.8
Yellow	72	34.4

In RVGE children, the following changes in the findings of general analysis of feces were revealed. As the table shows, moderate (42.8%) and excessive (17.2%) presence of mucus in the feces was characteristic for RVGE children, as well as moderate (51.4%) and excessive (8.7%) presence of neutral fats. In 60% of children, the feces got pathological coloring (greenish color). It, in turn, indicates the presence of local inflammatory process and disorder in the processes of digestion and absorption in the intestines that once again confirms the presence of infectious diarrhea of virus character.

We have analyzed the indicators of the complete blood analysis of children with ARI. The obtained findings are shown in Table 3.

In the complete analysis of blood of the majority of children, the erythrocytes indicators were within the age norm (69.4%). Leukopenia was observed in 42 (20%) of cases, while in the leukocyte count demonstrated minor alterations of all indicators. Also, one third of patients (31.5%) showed a decrease in the level of hemoglobin.

Table 3. – Hemogram indicators in RVGE children

Parameters	Patients' group	
	abs.	%
<b>Erythrocytes:</b> (normal $3.6-4.7 \times 10^{12}/l$ )		
Up to $3.6 \times 10^{12}/l$	47	22.5
From $3.6$ to $4.7 \times 10^{12}/l$	145	69.4
Over $4.7 \times 10^{12}/l$	17	8.1
<b>Hemoglobin</b> (normal 109–139 g/l)		
Up to 109 g/l	66	31.5
From 109 to 139 g/l	128	61.4
Over 139 g/l	15	7.1
<b>ESR:</b> (normal 2–8 mm/h)		
Up to 2 mm/h	19	9.0
From 2 to 8 mm/h	155	74.2
Over 8 mm/h	35	16.8
<b>White blood cells:</b> (normal $5.0-12.0 \times 10^9/l$ )		
Up to $5.0 \times 10^9/l$	42	20.2
From $5.0$ to $12 \times 10^9/l$	159	76.0
Over $12 \times 10^9/l$	8	3.8

Moreover, these values were registered in children with severe forms of the disease and, accordingly, a high level of the virus replication. In most cases (76%), leukocytes count were within the normal values.

#### Conclusion

Thus, in the general structure of AII, RVGE is considerably (31.1%) distributed among the population of Tashkent during the fall-winter seasons. The highest values of the disease indicators (67.7%) were registered among the children under 2 years, mainly unorganized ones.

RVGE children admitted to the hospital in Tashkent currently have been presenting typical clinical symptoms and signs: fever, vomiting and tympanism as well as catarrhal events since day 1 of the illness.

The changes in general clinic and laboratory indicators are insignificant. It predetermines expediency of introduction of highly sensitive methods of early verification of gastroenteritis of rotavirus origins for timely revealing and treatment of the patients.

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## Improvement of surgical treatment of esophageal atresia in newborns

**Abstract:** A comparative analysis of the results of surgical treatment of esophageal atresia (EA) with the use of advanced and traditional methods was performed. The case histories of 192 newborns whose primary esophageal anastomosis was performed from 2006 to 2015 were studied. Group 1 included 127 children operated by improved method since 2009; Group 2 consisted of 65 children operated by traditional method.

**Keywords:** esophageal atresia, complications, anastomotic leakage, treatment.

**Esophageal atresia (EA)** is one of the most common inborn defects of esophagus, the surgical correction of which is one of the most important problems of neonatal surgery and anesthesiology.

Despite the success achieved in the surgical correction of EA, there is a big number of post-operation complications in 40–60% of operated patients [1, 38–40].

According to literature sources, **anastomotic leakage** is the most common complication and it occurs in 14–17% [2, 44–46] to 32% of cases [3, 26–28]. Factors leading to anastomotic leakage include: ischemia of oral and aboral ends of the esophagus, strong strain in the zone of anastomosis given the diastasis of over 3 cm., use of inappropriate stitch material and imperfect surgical technique [5, 508–511].

Also, in the majority of works, **gastroesophageal reflux (GER)** is one of the most common complications during post-operation period. According to E. Somppi, O. Tammela, T. Ruuska et al (1998), GER occurs in 78%; according to D. Booss, H. Gigget (1998) in 42.8%; L. Spitz (1999) in 54%; D. Yu. Krivchenya, A. G. Dubrovin, A. D. Dudyrev (1994) reckon that GER occurs in all patients operated with regard to esophageal atresia [4, 13].

Thus, the problem of early post-operation complications shows a serious reason to search for new methods of treatment and makes it very necessary to improve the technique of surgical correction in the condition of esophageal atresia.

**Goal of the research:** improvement of the results of esophageal atresia treatment in newborns by way of improvement of the technique of surgical correction and reduction of post-operation complications.

### Materials and methods

During the period from 2006 to 2015, 264 newborns with different forms of EA were admitted in the department of neonatal surgery of the Republican Perinatal Center. There were 165 (62.5%) boys and 99 (37.5%) girls. Full-term newborns accounted for 197 (75%) and 67 (25%) were born prematurely.

Among 264 children with different forms of EA, 192 (73%) had initial esophagoplasty. All newborns with EA underwent the following at admission: esophageal intubation, Elephant test, contrast X-ray examination of the esophagus with water soluble contrast agent as well as ultrasound of internal organs, echocardiography and neurosonography. Combined defects and comorbidities were revealed in 31% (83) of cases. Most often, EA was combined with GIT diseases (anorectal malformations and duodenal ileus) in 11.4% of cases, heart diseases in 8.7% of cases, urinary system defects in

4% of cases and defects of other organs and systems in 4% of cases. Also, the following comorbidities were detected: cerebral circulation disorder with intra-ventricular hemorrhage (IVH) in 11 cases (5%), perforation of hollow organ of abdominal cavity in 1 case and inborn abdominal cavity tumor in 1 case.

This work presents a comparative analysis of the results of surgical treatment of 192 children with EA, who had initial esophagoplasty. For comparison and statistical processing of obtained data, the patients were divided into two groups depending on the way of operation. Group 1 (primary) included 127 (66%) children with EA, who had esophageal anastomosis performed by a new method and Group 2 (control) consisted of 65 newborns, in whom, during esophagoplasty, one-row interrupted stitches or, more rarely, two-row Haight stitches were used.

It is known that in the condition of EA, after posterolateral thoracotomy in III or IV intercostal space and extrapleural access to mediastinum, tracheoesophageal fistula is secured, diastasis is defined and anastomosis is created. Most often, in the condition of EA in newborns, straight anastomosis with the use of one-row stitches is performed with atraumatic needle through all layers of esophagus. Ventricle is probed during the operation with a gastric tube the size of 6 Fr/Ch or 8 Fr/Ch. The operation finishes with a placement of drainage to the zone of inter-esophageal anastomosis.

The drawbacks of the traditional method of surgical treatment of EA are as follows: sufficient leak-tightness is not created, which can cause «leakage» of the content of the esophagus between interrupted stitches. In cases of gastric content discharge into the esophagus (gastroesophageal reflux), the latter can enter the mediastinum through the holes between anastomotic stitches and cause leakage and mediastinitis. Even in the vent of partial anastomotic leakage, there is risk of another complication — relapse (recanalization) of tracheoesophageal fistula, which requires a compulsory repeated operation.

Taking into account the above stated, the approach in esophageal atresia has changed since 2009. We use an advanced method of application of esophageal anastomosis and ventricle probing in newborns with EA. The purpose of this novelty is to create sufficient security of esophageal anastomosis, prevent gastroesophageal reflux during early post-operation period, thus improving the results of operative treatment of esophageal atresia in newborns. The method lies in the following: first, posterolateral thoracotomy in III–IV intercostal space, extrapleural access to the esophagus, then mobilization of closed end of the esophagus, liquidation of tracheo-esophageal

fistula and application of straight esophageal anastomosis with one-row uninterrupted stitches through all layers of the esophageal wall with atraumatic needle, vicryl 6/0 and vascular acceptance. The latter was performed as follows: after the promotion of ventricle probing, one-row uninterrupted stitch leaving both ends of the thread as traction suture, then, with the help of traction sutures, turn the esophagus 180° along own axis to apply one-row uninterrupted stitch on the posterior wall of the esophagus. After the removal of traction sutures, the esophagus returns to normal anatomic position turning 180° along its axis. Also, when applying uninterrupted stitch, the needle should enter at the distance of 0.2 cm. from the edge of distal end of the esophagus, herewith, the esophagus partially enters the lumen of the oral end of the esophagus.

It is known that in EA, gastroesophageal reflux is often observed due to the disruption of angle of His. This may contribute to the penetration of gastric juice in the zone of anastomosis during early post-operation period and can lead to anastomotic leakage and/or other early post-operation complications. Hence, to prevent the penetration of gastric content in the zone of anastomosis, catheter Foley-6 Fr/Ch was used as gastric probing, which is placed into ventricle during operation, blown up and tightened. As a result, gastric cardia is sealed with a blown-up part of the catheter thus protecting the zone of anastomosis from the penetration of gastric content during early post-operation period. Consequently, it prevents the development of anastomotic leakage.

#### Results and discussion

During post-operation period, contrast X-ray of the esophagus was performed on 2–3 day to detect gastroesophageal reflux. Also, the control of the condition of anastomosis was conducted, if there was a suspicion of anastomotic leakage (in case of appearance of mucus-foam discharge in drainage) with water soluble X-ray contrast substance. The feeding of children with EA started on 4–5 day at small diastasis, and, at big diastasis, not earlier than on 7–8 day of the post-operation period. In case of absence of signs of leakage, the drainage was removed from posterior mediastinum on 6–7 day post operation. In case of anastomotic leakage, drainage from mediastinum and gastric probing were not removed until full healing of fistula. The period of healing of fistula was  $32 \pm 7.5$  days.

The indicators of early post-operation period in the patients of primary and control groups are presented in Table 1.

Table 1. – Indicators of the early post-operation period in patients with EA

Indicators	Primary group (n = 127)	Control group (n = 65)
Gastro-esophageal reflux	–	60 (92 %)
Leaking of anastomosis	–	34 (52 %)
Anastomotic leakage and mediastinitis	4 (3 %)	15 (23 %)

As the table shows, among the patient in the primary group operated by the improved method, in the early post-operation period, gastro-esophageal reflux during contrast X-ray research was not revealed in a single case, and among children of the control group, gastro-esophageal reflux was detected in 60 (92 %) cases. This certifies about the fact that esophageal probing with the catheter Foley-6 Fr/Ch effectively prevents the penetration of gastric content in the zone of anastomosis.

Moreover, among the patients of the primary group, anastomotic leakage was observed only in 4 (3 %) children, which is almost 8 times less than in the application of anastomosis by traditional method. «Leaking» of mucus was not detected in this group, because uninterrupted stitches on the esophagus secured the tightness of anastomosis.

In the control group (n = 65), «leaking» of anastomosis in the early post-operation period was noted in 34 (52 %) patients, and anastomotic leakage — in 15 (23 %) patients. Although, most of these children showed for a long period of time own closing of the leakage, 6 (40 %) of them developed severe purulent-septic complications, which were one of the leading reasons of post-operation deaths.

The results of our observations allow concluding that the improved method of surgical correction significantly reduces the risk of post-operation anastomotic leakage and improves the results of operative treatment of esophageal atresia. This method is patented under № IAP 05092 and registered in the state register of inventions of the Republic of Uzbekistan.

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## Minimum closure of myomatous nodule floor as the sparing method, reducing surgical traumas at conservative myomectomy

**Abstract:** In purpose on to studying of influence of operative techniques of conservative method of myomectomy at women of reproductive age on a cytokine state of blood profile in aspect of reduction of intraoperation surgical trauma of the tissue there have been made conservative myomectomy (CME) by laparotomy at 46 women with a uterine myoma on developed by

us technique. Efficiency of a technique on the 3<sup>rd</sup> and 5<sup>th</sup> days of the postoperative period estimated with definition in dynamics of Interleukin 1, 6 and TNF-a level in blood. For 3<sup>rd</sup> days after the operational period in group of women with which it has been made conservative myomectomy by a traditional method marked authentically sharp increases in level of maintenance of IL-1; IL-6 and TNF. Results showed high efficiency of new technique CME in comparison with a traditional method in preservation of reproductive to function of women.

**Keywords:** uterus myoma, conservative myomectomy, cytokine, interleukin, surgical trauma.

### Introduction

Studying of results of surgical treatment shows, that the current of the postoperative period is in many respects connected as with volume of surgical intervention in a abdominal cavity, and with localisation and the sizes of an operational wound [3; 4]. In reply to any damage, whether it be the trauma, surgical operation, an infection, etc., in an organism develops a complex of the physiological reactions directed on localisation of the centre of damage and restoration of disturbed functions [1; 2; 3; 5].

This difficult process, directed on preservation of a homeostasis, is known as an inflammation, and a complex local and system changes, originating after damage, makes concept of an acute phase of an inflammation. Cytokines play basic role in realization of the inflammatory answer to the surgical trauma. Cytokine production reflects a traumatizing of surgical intervention. The strengthened synthesis of cytokines begins in reply to penetration into organism a microorganisms or damage of fabrics. After extensive surgical interventions a cytokine concentration reaches a maximum by 24 o'clock and remains increased throughout 48–72 hours of the postoperative period.

Last years, because of development of methods of quantitative definition of levels of cytokines production, it has been reached considerable progress on understanding of the role of some cytokines in norm and in pathology [2; 4]. The high level of studied cytokines testifies to development of a local and general inflammation. So, IL-1 in consequence of the ability to increase of body temperature it is established as endogen pirogene. The tumor necrosis factor-a (TNF-a) stimulates a local inflammation, and in system — causes a syndrome of a septic shock, activates and damages cells, operating on cells of hypothalamus, causes a fever, secretion of IL-1, IL-6, fibers of acute phase [2; 3; 5]. At studying of results of operative interventions it is necessary to note the traumatizing factor or “surgical stress”.

It is known, that blood cytokine level reflect a current condition of work of immune system and development of protective reactions, gravity of inflammatory process and its transition to system level. Cytokine production reflects on traumatizing of surgical intervention [1; 2; 4].

### Research objective

An estimation influence minimum closing of myomatous nodule floor at performance conservative myomectomy at women of active reproductive age on a condition a blood cytokine profile in aspect of reduction of a surgical trauma of the tissue.

### Material and methods

Research and treatment was conducted in department of operative gynecology of the Republican specialised scientific-practical medical centre of obstetrics and gynecology (RSSPMC O&G), Tashkent. In total there have operated 66 women at the reproductive age, suffering with uterine myoma of various localisation and the sizes. All patients have been divided on two groups depending on a technique of performed CME method. The group I was made by 46 patients, whom it has been performed CME by the technique which developed by us; and group II (comparison group) included 20 women at whom CME was made by a traditional method. The age of patients varied from 20 up to 42 years (in average  $33.51 \pm 2.4$  years) in both groups.

Estimation of efficacy of developed ME technique was spent followingly.

Prior to and after operation in dynamics: estimated blood pro inflammatory cytokine levels. Research the maintenance of interleukin-1 (IL-1), interleukin-6 (IL-6), The tumor necrosis factor (TNF-a) in blood plasma of women determined by immune enzyme analyzing on commercial test systems of firm “Vector-best” by means of IFA analyzer “Anthos-2010” (Austria) in dynamics before operation and on the 3<sup>rd</sup>, 5<sup>th</sup> days of the postoperative period.

On the early postoperative period: in dynamics observed of a body temperature, visually estimated healing of a postoperative wound, and also by dopplerometry on the 5<sup>th</sup> day after operation estimated a postoperative hem condition on a uterus.

In 3 months after operation estimated a psychosomatic condition and also character менструальной functions of women by the conducting a questioning.

### Results and discussion

All women from clinical group during performing a CME were applied the surgical technique developed by us which consisted in the following. Laparotomy was carried out by the method John Koel, after, we have tied up a 3 pair of uterine arteries, and myomatous uterine was carried out into the wound are by hands defined the location and the size of intramural myomatous nodule. Depending on localization of nodules the cut of a serous cover and its capsule was made slit, transverse or oblique. Enucleating of myomatous nodule were performed preferentially by blunt way. Then have imposed a suture on a nodule floor bottom, using synthetic resolving suture material — vicril, legate, the short end of ligature deduced in the middle outside, and with another longer end made concentric closure of lateral walls of the nodule floor by legating after each tour. And amount of tours depended on size of nodule and its depth of penetration. Last tour closure was made subserous without an exit into abdominal cavity. The ends of ligature were knuckling and immersed in a nodule floor cavity. Thus, there will achieved a maximum tightening of walls of nodule floor, both in horizontal, and in a vertical direction which allows in further to formation of valuable hem. It promotes more high-grade preservation of reproductive function. Absence of legate on the surface of uterine will reduces probability of development of adhesive process in the abdominal cavity.

As a result of the carried out researches it is established some features of change of cytokine status in blood plasma in women with uterine myoma, depending on a performed method of CME. Preoperative initial levels of IL-1 in both groups essentially did not differ among themselves and have made 1.84 pg/ml in the basic group and 1.48 pg/ml in comparison group ( $p > 0.05$ ). On the 3<sup>rd</sup> days after operation there has been noted sharp increase of maintenance of IL-1 up to 135.74 pg/ml in comparison group, that on 90 times exceeded its initial level. In the main group a maintenance of IL-1 essentially has not changed and has made 1.98 pg/ml. On the 5<sup>th</sup> day of postoperative period a level of IL-1 in main group has decreased nearer to its initial level though in group of comparison with its initial level did not reach initial sizes. Although, IL-1 is endogen pirogen, owing to the ability to increase of body temperature, we can

explain temperature reaction at 16 patients in group II. In the group I subfebrile temperature was registered only in 3 patients.

Results of research of IL-6 levels at women in compared groups were given by following data. In patients from comparison group the level of IL-6 has made — 6.15 pg/ml, in main group patients — 4.88 pg/ml, and significant distinctions between them is not revealed. However, on the 3<sup>rd</sup> day at the postoperative period in women who have being performed CME by traditional method the level of IL — 6 has made the maximum value — 585.11 pg/ml against 5.46 pg/ml in main group. And in comparison with its pre-operative level ( $p < 0.001$ ), on the 5<sup>th</sup> day we observed decreasing in level of IL-6 to 7.94 pg/ml in comparison group, that came nearer to data before operation on 2 times exceeded similar indicators of the main group which by the end of 5<sup>th</sup> day have made — 3.82 pg/ml in comparison with its initial data.

As a received result from the analysis of the condition of TNF-a observed a similar pattern of change of its maintenance in dynamics on the postoperative period (table 1). So, on the 3<sup>rd</sup> day after performing of CME by a traditional method the level of TNF-a has made 27.59 pg/ml, that on 11 times has exceeded than its initial level (before operation) — 2.3 pg/ml and ( $P < 0.005$ ), on the 5<sup>th</sup> days it has made — 2.99 pg/ml, coming nearer to its initial data. In the main group at all investigation phases the level of TNF-a was stable and made: 2.05 pg/ml before operation, 2.29 pg/ml — on the 3 days and 1.93 pg/ml on the 5<sup>th</sup> day accordingly.

Analyzing the received data as a result of our research, we marked authentically sharp increases in level of maintenance of IL-1, IL-6 and TNF-a on the 3<sup>rd</sup> day after operation period in group of women which has been made CME by traditional method.

It is known, that IL-1, IL-6 and TFN-a are proinflammatory cytokines, so any damages or the microbic agent are named as «mediators» of local inflammatory reaction and acute phase answer of an organism. In a sharp phase of an inflammation at the expense of tissue damage to occur activation of macrophages which synthesize a

cytokines, thereof to what there will occur a changes of vascular endothelium, leading to increase in its permeability, expression increase adhesive molecules and infringements in coagulation system of blood.

Thus there is occurring an release of an inflammation mediators, such as histamine, glandins and other, responsible for developments of inflammatory reaction. And it in turn, promotes on stasis of blood in capillaries, venule, leading to strengthening of pre-coagulation link and development of edema [1; 3; 4].

Hyperproduction of cytokines — IL-1, IL-6, TNF-a at women in comparison group is explained by longer and extensive surgical interventions at performing a CME by traditional method. It is unfavorable factor of the postoperative period causing early postoperative complications (pain syndrome, early temperature reaction, tissue swelling).

Summarising the above-stated, it is possible to conclude, that during operative interventions it is necessary to consider so-called «surgical stress», i. e., the factor of traumatizing, which its degree depends on the level of maintenance of pro-inflammatory cytokines (IL-1, IL-6, TNF-a) in blood.

Analysis of body temperature reaction of patients on the postoperative period had received sensible data that at women which have been performed intra operation bandaging of 3 pairs uterine arteries and the developed method of closure of myomatous nodule floor, the temperature curve was limited from 36.6 up till 36.7°C. On the contrary, in group II, which has been performed CME by a traditional method, already on the 1<sup>st</sup> days after operation there have been registered increasing of body temperature up to 37.2°C. And it has been held at such level till on 4<sup>th</sup> days of the postoperative period. An increasing of body temperature after operation testifies to inflammatory reaction of organism to the operational trauma and on foreign bodies (suture materials). Than more stitching on an operational wound in the area of myomatous nodule floor and uterine, there is increased probability of inflammatory reaction of an organism. Body rise in temperature is caused with local inflammatory process; therefore its level remains in limits 37°C.

Table 1. – Pre-inflammatory cytokines in dynamics prior to and on the 3<sup>rd</sup>, 5<sup>th</sup> days after conservative myomectomy (M ± m)

Parameters	Prior to operation	On the 3 <sup>rd</sup> day after operation	On the 5 <sup>th</sup> day after operation
<b>Group I (n = 46)</b>			
IL-1	1.84 ± 0.21	1.98 ± 0.03	1.53 ± 0.32
IL-6	4.87 ± 0.24	5.45 ± 0.39	3.8 ± 0.39
TNF-a	2.046 ± 0.63	2.29 ± 0.54	1.93 ± 0.36
<b>Group II (n = 20)</b>			
IL-1	1.48 ± 0.25	135.74 ± 0.31*	2.08 ± 0.25
IL-6	6.1 ± 0.24	585.11 ± 0.30**	7.94 ± 0.34
TNF-a	2.3 ± 0.31	27.59 ± 0.29*	2.99 ± 0.36

Note: \* — statistical authentic in comparison with its initial level on  $p > 0.05$ ; \*\* — statistical authentic in comparison with its initial level on  $p > 0.01$

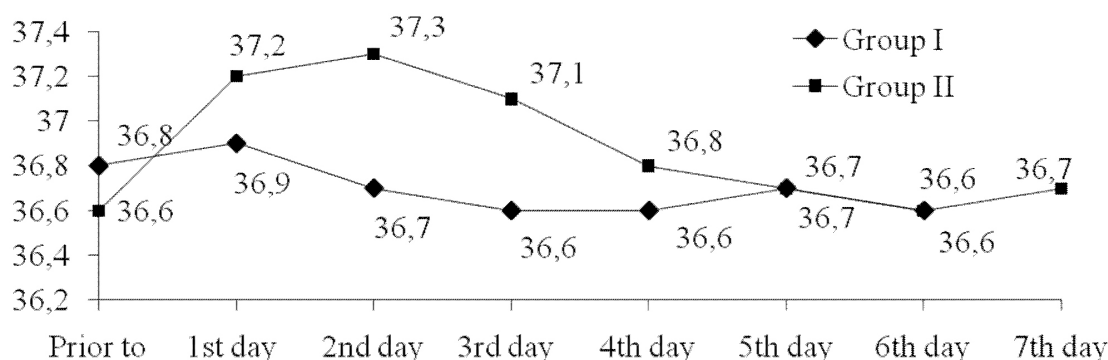


Fig. 1. Results of estimating of the body temperature (in Celcius) in dynamics prior to and after CME

As a proving, it is possible to result, for example, acute increasing of speed of erythrocyte sedimentation (SES) on the postoperative period. Acknowledgement of it, it is necessary to notice, that in patients from control group on the postoperative period synchronously with increasing of body temperature there is observed also acute lifting of speed of erythrocyte sedimentation on 60 % from its initial level, and in comparison with the group I it was in 2.5 times more.

Dopplerometry of uterine vessels, which carried out on the postoperative period, allowed to estimate of changes of blood flow in the blood stream of uterine arteries as after intra operative binding of three couples of major vessels and without it (table 2).

The received results attest that in the 1st group the course of the first days was defined by the unstable blood flow with a negative diastolic component that was indicative of incremental

recovery of blood flow in uterus vessels, however carrying out measurements of indicators of SCBF was complicated. In the 2<sup>nd</sup> group was defined the positive diastolic component of blood flow, and RI made  $0.89 \pm 0.06$ . From the second day of the postoperative period at women of the group II the full-fledged blood flow in vessels was visualized, it authentically decreased that was indicative of incremental recovery of blood flow in uterus vessels (see table 1). On the 4<sup>th</sup> day the difference in indicators of speed curve of blood flow at patients of both groups was registered, but thus at women of the group I the positive dynamics and normalization of blood flow remained. The analysis of condition of blood flow on the 6<sup>th</sup> day of the postoperative period according to a dopplerometry also revealed almost complete recovery and its improvement in arteries of uterus at patients of the group I: the studied parameters came nearer to that of the patients of the group II.

Table 2. – Indicators of dopplerometry of vessels of the uterus in the postoperative period depending on deligation of the major vessels on the 2<sup>nd</sup>, 4<sup>th</sup> and 6<sup>th</sup> days after conservative myomectomy ( $M \pm m$ )

Group	Postoperative period, Day	PI	RI	SDO
Group I	2	–	–	–
	4	$3.71 \pm 0.19$	$0.93 \pm 0.12$	$13.3 \pm 0.31$
	6	$2.44 \pm 0.11$	$0.83 \pm 0.09$	$5.9 \pm 0.29$
Group II	2	$2.35 \pm 0.17$	$0.89 \pm 0.06$	$9.0 \pm 0.27$
	4	$2.29 \pm 0.09$	$0.85 \pm 0.06$	$6.6 \pm 0.39$
	6	$1.89 \pm 0.11$	$0.81 \pm 0.07$	$5.3 \pm 0.21$

Note: \* —  $P < 0.05$  in comparison with women of the group II

Estimation of postoperative hem condition on a uterus for 5th days after operation by the ultrasound research have found out an anechogene zone in the field of the hem, and the expressed vascular pattern, and postoperative hem length did not exceed up to 0.8 sm. in women from group I. Whereas in patients from group II the size of hem has made from 1 up to 3 sm.

According to the questioning which was carried out in a 3 months after operation, there were determined no neurologic violations at the operated women of group I. And menstrual function at them was restored from the second month.

In patients from the group I on the postoperative period there were not observed of an intestinal motility disturbances as it has been occurred in some patients from control group.

Main objective of the method of conservative myomectomy is preservation of reproductive organ, and also recovery of reproductive function. For decades of use of this method the cases of successful carrying out operation in the presence of several tens myomatous nodules are recorded. Thus, technical capability of performance of conservative myomectomy exists at most of patients with uterus fibroid, but much also depend on readiness of the surgeon and expediency of carrying out such an operation in modern conditions. When the issue of need of carrying out conservative myomectomy at the women planning pregnancy is resolved it is very important to define accurately the ratio of advantage and risk of surgical intervention. Removal of myomatous nodules, though recovers integrity and functionality of body, is at the same time interfaced to known complications and consequences for reproductive system. The main complication in modern conditions of surgery is adhesive process, which can become the reason for infertility [2; 5]. Attempt of removal of a large number of lumps can also be inexpedient as a set of stiches on uterus can render on the subsequent realization of reproductive function more negative effect than the removed lumps. Besides, when putting a stich on the floor after removal of myomatous nodule,

owing to damage of trophism of tissues, the local site of damage is formed, therefore in the area of the stich fibrin deposits, that further leads to formation of adhesion of parts [3; 5; 6; 8]. Thus, selective binding of uterine arteries with use of dissolving material during surgery creates optimum conditions for the surgeon, promotes reduction of the extend of intra operative blood loss, shortening of time of operation and, above all, eliminates some reasons complicating operational technique during operation. At the same time early recovery of blood circulation in the area of the scar on uterus provides its fast healing, and the minimum sealing of the bed prevents formation of rough scars on uterus, therefore, prevents formation of adhesion of parts in the field of the scar.

### Conclusions

1. On time intraoperative binding of three couples of major vessels of uterus with use of catgut suture to conservative myomectomy promotes decrease in the extend of intra- and postoperative blood loss, temporary stop of blood flow in this course of blood circulation and is an effective prevention of postoperative complications.

2. The offered new technic of closing of myomatous nodule floor allows to hold muscular tissue in reposition condition, without ishemization of the stitched and adjacent areas, and the absence of stiches on external surface of uterus reduces the risk of development of adhesive process. The blood flow in uterus vessels after intraoperative binding of three couples of major vessels gradually recovers from the second day of the postoperative period, the complete recovery of blood flow comes by the 6<sup>th</sup> days.

3. Thus, it is possible to conclude, that the new method of CME applied by us is less traumatic, which not causing a «surgical stress», that it is proved by not changeable levels of the maintenance of markers of a condition of work of immune system and development of protective reactions — pro-inflammatory cytokines IL-1, IL-6 and TNF-a in women from main group. Hence, our results showed high efficiency of new technique CME in comparison with a traditional method in preservation of reproductive to function of women.

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## Patches characteristics

**Abstract:** based on the analysis Labeled Nuclei Index (LNI) after two-fold injections 3H-T should be noted it is also non-uniform growth and decrease in various structural-functional zones of lymph nodules (LN) of Payer's patch. On the one part, it reflects the constant and irregular migration of T- and B-lymphoid cells from blood into the area. On the other hand, heterochronous changes of LNI in T- and B-dependent and mixed areas of lymphoid nodules should be considered as a measure of the optimum adaptation of the small intestine by reacting of mucous membrane's immune system (MMIS) afferent and efferent units, peripheral and central parts of the immune system in the regulation of immune homeostasis.

**Keywords:** of mucous membrane's immune system, Labeled Nuclei Index, lymph nodules, Payer's patch, immune regulation is an urgent and fundamental clinical problem

### Introduction

The mucous membrane of the small intestine along with the implementation of the digestive-absorptive function also performs endocrine, immune and other functions. Due to the complex mechanisms of integration of the epithelium, the afferent and efferent parts of the mucous membrane of the digestive tract immune system provides perfect processes of digestion and absorption, the homeostasis of the internal environment, despite the unpredictability of the quality and quantity of food, microorganisms in their structure. One of the components of this complex mechanism of regulation of homeostasis are the structure and function of single or grouped lymph nodules (LN) and Payer's patches (PP), the space-time organization proliferation, integration and adaptation of its structural-functional zones and epithelium. As is generally known in the crypt system studied in detail such processes as proliferation and differentiation of intestinal mucosa, extrusion operation (death) of the epithelium at different endoecology, dietary habits and exposure to adverse factors [5; 6]. However, the role and importance of the epithelium, the individual structural functional areas LN and PP, their concern and significance between themselves and circulating blood, blood-forming organs, involved in immune regulation is an urgent and fundamental clinical problem, the subject of attention of studies in recent years [1; 2; 4; 7; 9; 10].

### Purpose of the study

To explore the features of the epithelial proliferation and migration and structural-functional zones of lymphatic nodules Payer's patch on the basis of the dynamics of the Labeled Nuclei Index (LNI) after multiple injections of labeled DNA precursor of thymidine (3H-T).

### Material and methods

Outbred white-male rats weighing 120–140 g. have been made intra-abdominal introduction of 3H-T (Ci/kg) with 6 hours intervals: one-fold (I group), two-fold (II group) and threefold (III group). Between multiple injections of 3H-T is less than the length of the synthetic (S) period of the mitotic cycle of proliferating cells of hematopoietic organs and LN of PP. This allows you to explore the relationship between the pool of proliferating cells in a variety of structural and functional areas LN. Removing animals from the experiment carried out under Nembutal anesthesia and in compliance with the European Convention for the Protection of Animals used in research and development (1984): after 1, 2, 3, 7 and 24 hours (I group); in 1, 2, 3 and 24 hours (II, III groups.). Pieces of tissue PP from the middle jejunum after fixation in Carnua's fluid. Oriented sections of 5–6 mm. thickness, obtained through the middle LN of PP and longitudinally in the crypt-villus system after dewaxing covered with fine-grained photographic emulsion type M. The exposure time was 20–22 days. After development, the emulsion and fixing the obtained marks above the body-core sections stained with hematoxylin Karachi. After dehydration, enlightenment and conclusion sections of crypts surrounding PP in each structural and functional area LN of PP (germinal (embryonic) center, follicular, pair-follicular zone and dome) separately, the dynamics of the experiment was determined LNI (0/00; ratio of labeled and unlabeled nuclei of epithelial and lymphoid cells by 1000 their total number). Statistical analysis of the results of the LNI count was carried out according to Statistics 2008 program.

### Results

After a one-fold injection of 3H-T in 1 hour there were the lowest LNI lymphoid cells in the follicular area LN. In comparison, the

germinal center, the dome epithelium and para-follicular zones were named, on average, respectively, 6, 11, 38 and 69 times higher (see Table.). The cylindrical shape of the crypt located at the periphery of the dome-shaped protrusion grouped LN into the lumen of the gut; labeled epithelial cells that line the surface were detected in the lower half. After 2 hours after injection of 3H-T LNI from baseline in the germinal centers, follicular and para-follicular zones, the dome LN respectively increased to 9, 93, 23 and 4.5 times on average. This significant increase of labeled lymphoid cells can be labeled with the migration of labeled lymphoid blast cells of the blood capillaries, forming anastomosing network in each of the test zones (1, 4, and 8). After injection the tags circulating in the blood of 30 to 60 min., engaged in virtually all cells, including hematopoietic and in circulating blood that were in a synthetic phase of the mitotic cycle. LNI crypt epithelium increases only 1.75 times, which is natural for a stationary system crypt-villus, which from the outside do not come labeled cells. Theoretically, the end of the second hour after injection of the labeled DNA precursor they can complete mitosis that diluting the density of labels LNI increases almost 2-fold. As compared with the epithelial cells in lymphoid LNI structural-functional zones LN of PP has increased very significantly in comparison with its initial value. This expression, distinguished by the intensity of migration of T and

B-blasts in appropriate area, causing uneven growth in their name. Each subpopulation of immune cells, differing to participate in immunological reactions, under the influence of regulatory systems that improves the immune response to antigens of microorganisms and digestible food, provides intense immune potential of the organism. Three hours later after a single injection of 3H-T LNI germinal center was almost unchanged compared with the previous term of experience. However, in the follicular and para-follicular zones and dome LN of PP it is declined an average of 5, 2 and 2 times respectively compared to the previous study period (Table 1). 7 hours after labeling LNI lymphoid cells from baseline is relatively high: in the germinal center, follicular and para-follicular zones and dome it is more an average of 5.3; 7.8; 2 and 12.5 times, respectively. However, in the dynamics, in comparison with the previous term experience LNI in the embryonic heart, follicular, para-follicular zones is reduced by an average of 1.8; 2.2; 1.3 times, respectively. In the dome LN of PP, on the contrary, LNI tends to increase. At 24 hours after a single administration of 3H-T in all the structural-functional zones LN of PP, except dome, labeled rare kernel. Only a fraction of labeled nuclei dome, although 2-fold lower compared with the previous period experience 7 times larger than its initial value, one hour after administration of the precursor DNA.

Table 1. – LNI of lymphoid cells the structural and functional areas of the lymph nodules and Payer's patch epithelium of the small intestine after the injection of H3-T ( $M \pm m, \%$ )

Time after injection	The multiplicity of injections	Germinal center	Follicular area	Para-follicular area	Dome	Epithelium
1 (n=9)	1	0.290 ± 0.0012	0.052 ± 0.001	2.02 ± 0.026	0.566 ± 0.012	3.60 ± 0.207
	2	4.64 ± 0.18	3.31 ± 0.24	12.5 ± 0.81	24.9 ± 1.7	5.87 ± 0.30
	3	10.14 ± 0.49	8.18 ± 0.35	19.77 ± 0.45	84.8 ± 1.5	5.96 ± 0.25
2 (n=9)	1	2.61 ± 0.18	4.86 ± 0.36	9.33 ± 0.20	13.1 ± 0.82	6.29 ± 0.26
	2	6.71 ± 0.27	5.45 ± 0.35	21.4 ± 0.75	34.3 ± 0.47	8.78 ± 0.31
	3	22.3 ± 0.72	9.77 ± 0.56	29.5 ± 0.63	129.4 ± 3.6	8.68 ± 0.87
3 (n=9)	1	2.75 ± 0.32	0.93 ± 0.017	4.92 ± 0.29	6.79 ± 0.25	6.14 ± 0.41
	2	5.35 ± 0.26	1.87 ± 0.16	10.74 ± 0.61	43.7 ± 0.67	9.62 ± 0.63
	3	19.18 ± 0.43	2.11 ± 0.18	21.3 ± 0.81	152.6 ± 2.7	9.29 ± 0.62
7 (n=9)	1	1.55 ± 0.16	0.403 ± 0.026	3.95 ± 0.28	7.13 ± 0.28	6.07 ± 0.31
	1	0.145 ± 0.015	0.105 ± 0.001	0.315 ± 0.043	3.96 ± 0.11	6.08 ± 0.15
24 (n=9)	2	0.116 ± 0.010	0.259 ± 0.023	1.32 ± 0.12	4.32 ± 0.38	11.7 ± 0.56
	3	0.145 ± 0.006	0.155 ± 0.020	1.14 ± 0.012	8.58 ± 0.75	12.9 ± 0.70

Epithelium of LNI crypt in every 2, 3, 7 and 24 hours experience in dynamics had not varied significantly, that was in a closed stationary system crypt-villus labeled cells migrated along the crypt only gradually differentiated when moving upwards.

Based on the analysis LNI of lymphoid cells LN of PP and epithelium covering its surface, we can conclude the following:

1. The proportion of cells of lymphoid tissue structural and functional areas LN and crypt epithelium of jejunum, in the DNA synthesis phase, varies considerably;

2. LNI crypt epithelium by 2 hours after a single administration of 3H-T increases almost 2-fold in the dynamics subsequently not change significantly during the 24 hours; Proliferative pool of epithelial crypt cells under physiological conditions varied slightly and almost remains constant throughout the experiment;

3. LNI of lymphoid cells in the structural and functional areas of lymphoid nodules for 1–3 hours, and unevenly increases significantly due to intensive migration from the blood and blood-forming organs;

4. Relatively intense (dozens of times) in the follicular germinal center zone (B-dependent zone) indicates that they are phylogenetically and developmentally both afferent link of mucous membrane's immune system (MMIS) small intestine primary

locus interaction and stimulation of B-blasts. T blasts and differentiated subpopulation of T lymphocytes as constituting single functional LN of PP systems integrated with B-population and it seems to regulate processes antigen substrates and stimulate differentiation of B-lymphocytes (4, 8, 9, 10, and 11).

After two-fold injection of 3H-T (II group) in 1, 2, 3 hours the LNI lymphoid cells in structural and functional areas of the epithelium and LN of Payer's patches significantly larger than an appropriate time after a single injection experience DNA precursor. By the end of the first hour in the follicular, para-follicular zones, germinal center of the dome and it increased to respectively 63, 6, 64 and 16 times the average. After 2 hours in the respective zones LNI of lymphoid nodules rose respectively 1.6; 1.7; 1.4; 1.4 times on the average. LNI epithelium increased only 1.5 times. Therefore, within 2 hours after introduction of DNA precursor of a two-fold (the interval between injections 6 hours) LNI of epithelial and lymphoid cells in appropriate structural-functional zones lymphoid nodules increased almost identical — in average 1.5 times. However, the value of LNI after two injections, compared with a single more in the germinal centers, follicular and para-follicular zones and dome respectively 2.6; 1.1; 2.3; 26 times on average. LNI of crypt epithelium differs by 1.4 times.



Three hours later after two-fold injections of 3H-T LNI dynamics in all areas LN decreased, though in varying degrees: in the germinal center — 1.25; follicular — to 2.9; para-follicular areas — 2.0 times on average compared with the previous term experience. Only in the dome LN, it increases 1.3 times. After 24 hours, after a two-fold administration of 3H-T the LNI of lymphoid cells in the germinal centers, follicular area and a small dome, located at the level of such after one-fold injection marks. Only in para-follicular zone LNI almost 4 times higher than after a single injection of 3H-T.

Thus, based on the analysis LNI after two-fold injections 3H-T should be noted it is also non-uniform growth and decrease in various structural-functional zones of LN of Payer's patch. On the one part, it reflects the constant and irregular migration of T- and B-lymphoid cells from blood into the area. On the other hand, heterochronous changes of LNI in T- and B-dependent and mixed areas of lymphoid nodules should be considered as a measure of the optimum adaptation of the small intestine by reacting MMIS afferent and efferent units, peripheral and central parts of the immune system in the regulation of immune homeostasis.

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## The prevalence of diabetic retinopathy among people with pre-diabetes and newly diagnosed type 2 diabetes in Tashkent city and Tashkent region

**Abstract:** The article contains information about the prevalence of diabetic retinopathy in people with pre-diabetes in Tashkent city and Tashkent region of Uzbekistan. In patients with diabetic retinopathy (DR) detected was found in 14.3 % of cases. The defeat of the retina is observed before manifestation of diabetes in some surveyed patients with violation glucose metabolism (VGM).

**Keywords:** Diabetes mellitus, Diabetic retinopathy, Uzbek Republic, Tashkent, prevalence.

Diabetic retinopathy (DR) has been and remains the most serious complication of diabetes mellitus, occupying one of the first places among the causes of blindness in people of working age [2; 7].

According to the data of regional endocrinology dispensaries of the Republic of Uzbekistan in 2014 over 68,158 patients with diabetic retinopathy have been registered and 847 patients are suffering of blindness due to diabetes complications. Prevalence of DR

among the patients with diabetic mellitus (DM) consists 47.2 % and 0.6 % blindness.

These data do not show the real picture of the DR prevalence in Uzbekistan. In other countries indicates that the real number of patients with type 2 diabetes in several times (3–5 times) higher than reported. It is important to note that at the time of the manifestation of type 2 diabetes in 16–37 % of patients has a DR at various stages of development [2; 3; 4; 5].

The only real way to early detection of DR is a widespread population screening tests. Implementation of the DR screening according to the St Vincent Declaration Protocol allows saving vision of approximately 60 % of patients within 10 years [6].

All of the above indicate the need for early detection of DR in patients with type 2 diabetes to assign an adequate therapy to prevent serious and not reversible complications.

#### The main objective

The study of the prevalence of DR in Tashkent and Tashkent region among people with impaired fasting glycaemia (IFG), impaired glucose tolerance (IGT) and patients with newly diagnosed type 2 diabetes (NDD2).

#### Materials and methods

Examination of involved healthy population (n = 1014) to identify a violation glucose metabolism (VGM) in Tashkent city and Tashkent region within the state grant project “The ADSS 15.12.2.” in 2015. There were identified 217 people with VGM. The screening has been conducted on DR among people with a diagnosis of exposed (according to WHO classification proposed in 1999). IFG (n = 26), IGT (n = 95) and NDD2 (n = 96) [1].

Fundus examination was conducted by dilated pupil by direct ophthalmoscopy (Heine mini 3000) using the drug “Midoptik”. Identified changes were classified, according to ophthalmic criteria proposed by E. Kohner and M. Porta in 1998, into the following diagnoses:

- nonproliferative diabetic retinopathy (NPDR);
- preproliferative diabetic retinopathy (PPDR);
- proliferative diabetic retinopathy (PDR).

#### Results and discussion

According to the results of the study among persons with VGM (n = 217) in the group of patients with IFG the retinopathy was not detected. DR frequency among persons with IGT was 13.7 % (n = 13) and only NPDR. As well as patients with type 2 NDD2, DR — 18.8 % (n = 18). Among people with NDD2 the NPDR accounted for 11.5 % (n = 11), PPDR — 5.2 % (n = 5), the PRD — 2.1 % (n = 2).

Comparison of the screening data of DR in 2008 and 2015 of introduced the following: IGT (2008, DR – 9.6 %; 2015, DR – 13.7 %) and NDD2 (2008, DR – 15.1 %; 2015, DR – 18.8 %). So, the quantity of people with DR has increased respectively by 4.1 % and 3.7 % [5].

Of the total number of ophthalmic examined people (n = 217), DR is set at 14.3 % (n = 31): NPDR — 11 % (n = 24) PPDR — 2.3 % (n = 5), the PRD — 1 % (n = 2).

Gender a difference in the frequency of DR patients that we surveyed is not revealed as indicated in Akbarov Z. S., at all. [1]. It was identified direct dependence of the DR frequency on age of the patients. In subjects with IGT in the age group of 49–55 years old DR frequency was 40 %, while in the group of 56 years and elder — 60 %, of patients with NDD2 the DR frequency was respectively 50 % and 50 %.

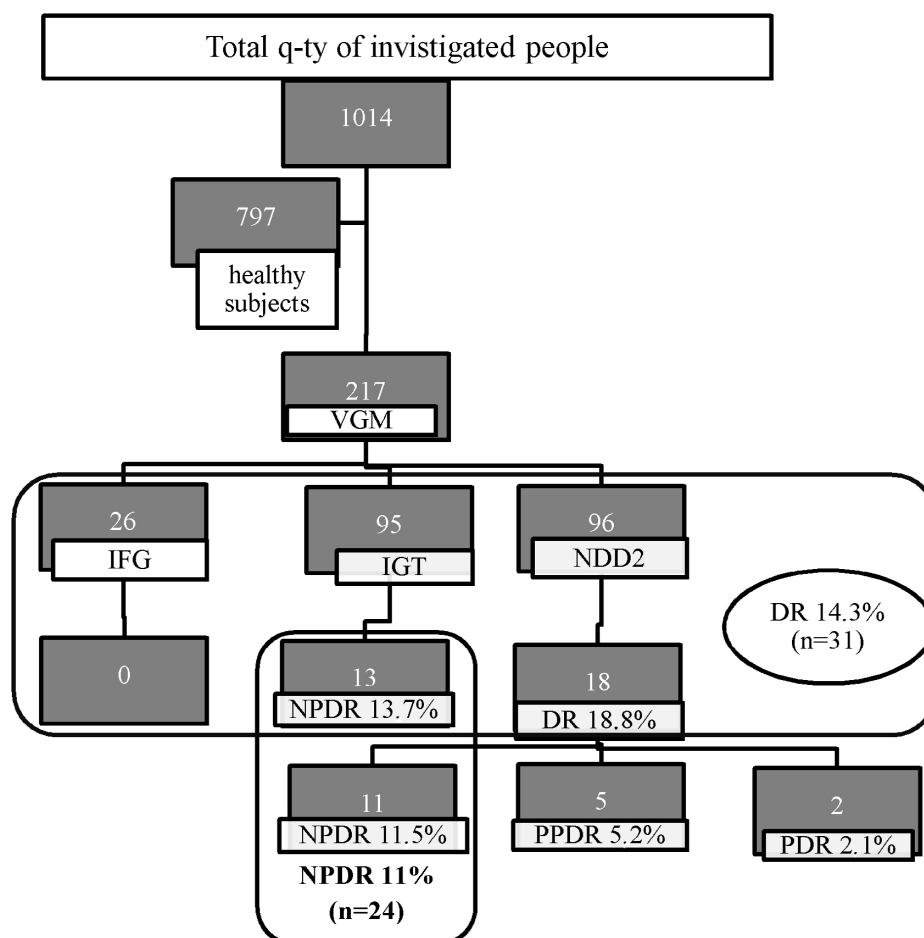


Fig. 1. VGM — a violation glucose metabolism; IFG — impaired fasting glycaemia; IGT — impaired glucose tolerance; NDD2 — newly diagnosed type 2 diabetes; DR — diabetic retinopathy; NPDR — nonproliferative diabetic retinopathy; PPDR — preproliferative diabetic retinopathy; PDR — proliferative diabetic retinopathy

**Study Design**

It should be noted that the persons with DR among VVSD2 already suffer of decompensated stage of type 2 diabetes. Fasting glycaemia  $11.5 \pm 2.4$  mmol/l, postprandial glycaemia —  $15.7 \pm 5.2$  mmol/l, the average level of glycated hemoglobin (HbA1c) is  $9.4 \pm 2.5$  %.

Among the people with IGT the DR average indicators were as follows: fasting glycaemia  $4.36 \pm 0.55$  mmol/l, blood glucose after glucose load 75 g. —  $9.5 \pm 0.4$  mmol/l, the average level of HbA1c —  $5.3 \pm 0.8$  %.

The DR prevalence study depending on the compensation of carbohydrate metabolism is of high interest. In more than 7.5 % patients with HbA1c, regardless of gender, the number of recorded cases of DR is 2 times higher than that of the patients with less than 7.4 % HbA1c. These data confirm once again the need for close

collaboration between ophthalmologists and endocrinologists in detection and monitoring of these patients.

**Conclusions:**

1. In patients with DR detected was found in 14.3 % of cases. In patients with IFG DR has not been revealed. In IGT and NDD2 DR detected accordingly in 13.7 % and 18.8 % of cases. The defeat of the retina is observed before manifestation of diabetes in some surveyed patients with VGM.
2. The patients with HbA1c more than 7.5 %, irrespective of gender, the number registered cases of DR is 2 times higher than patients with less than 7.4 % HbA1c.
3. Persons with VVSD2 complicated with DR were all decompensated.

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## Features of clinical picture of cystic dilatations of the biliary ducts in children

**Abstract:** This work presents characteristic clinical signs of the cystic dilatations of the extrahepatic biliary ducts in 76 children of the age from neonatal period to 16 years, receiving treatment in the clinic in 1979–2016. There were determined frequency, special features of some clinical signs, character of their association and occurrence of various complications. The features of current of separate clinical attributes, character of their combination and occurrence of various complications are determined frequency.

**Keywords:** cysts of biliary ducts, clinical picture, complication, children.

Until recently time the cystic dilatations of the extrahepatic biliary ducts have been considered as relatively rare pathology among the congenital anomalies of the development of the organs of hepatobiliary zone. The number of publications based on the analysis of the large clinical material has been significantly increased [3; 4]. However, in the literature the features of clinical expressions of cystic dilatations of the extrahepatic biliary ducts are insufficiently elucidated (CDEHBD).

The classic triad consists of jaundice, pain syndrome and palpated tumor in the abdominal cavity [1]. As a rule, the clinic of cystic transformation can be limited by one or two symptoms from this triad [2]. At occurrence of complications the clinical manifestations of illness essentially vary. Quite often the choledochal cysts may be in general not shown in any way for years and are diagnosed as a

casual find or are not distinguished not only at clinical examination, but even during surgical intervention.

**The purpose** of research was to analyze features of clinical manifestations of cystic dilatations of the extrahepatic biliary ducts in children on the basis on the basis of the own clinical material.

**Materials and methods of research**

In the clinical bases of the faculty of hospital children's surgery, children's oncology of the Tashkent Pediatric Medical Institute in 1979–2016 there were studied and treated 76 patients (60 girls and 16 boys) of the age from the neonatal period to 16 years with cystic dilatations of the extrahepatic biliary ducts.

The distribution of the patients by a type of cystic dilatation was performed according to classification of Alonso-Lej F. with

additions of Todani T. and Lilly J. R.: type I was cystic dilatation of the common bile duct (55–72.4%); type IV was cystic dilatation of the extra- and intrahepatic ducts (19–25%); type V — Caroli disease (1–1.3%); atypical forms (AF) were presented as insignificant dilatation of extrahepatic ducts and intrahepatic cystic lesions (1–1.3%). In our studied there were no types II and III.

The clinical anamnesis, clinical expressions, data of the auxiliary methods of diagnosis (ultrasonography and MSCT of the abdominal cavity, intraoperative cholangiography, histomorphologic investigation of the liver biopsy) was carefully investigated.

### Results and discussion

The basic clinical features were spasmodic pain in the abdomen — 24 (31.6%), jaundice — 14 (18.4%), palpated tumorous mass — 1 (1.3%) and various combinations of the listed symptoms — 37 (48.7%): pain + jaundice (26), pain + tumorous mass (2), jaundice + tumorous mass (2), pain + jaundice + tumorous mass (7).

The abdominal pain syndrome appeared to be the earliest and often clinical sign. In the newborns and infants (23–39%) the attacks of pains were expressed by anxiety of the child of various duration and intensity. In the children of the senior age groups (36–61%) the pains of spasmodic character were located: in the top departments of abdomen (10–27.8%); in the right half of abdomen (24–66.6%); in the area of umbilicum (2–5.6%). In 7 (11.9%) from 59 patients there was noted irradiation of the pains into the back. In 17 (22.4%) from 76 patients the abdominal pains were not registered; not intensive, passing pains remained to be unnoticed. Frequency of pain attacks were various: in 16 (27.1%) — 1 time per 2–3 months; at 11 (18.6%) — 2–3 times per one year; at other 32 (54.3%) patients repeated some times per one month. At a persisted attack at 32 (54.3%) from 59 children the pain syndrome was stopped by spasmolytics and analgesics. In 41 (69.5%) patients abdominal pains were accompanied by nausea and vomiting. In 22 (37.3%) from 59 children the pain attacks were provoked by errors in a diet, physical loading. On the basis of comparison of clinical signs with the data of auxiliary methods of researches, it is possible to explain an origin of the pain syndrome in these patients by secondary inflammatory changes in a gall bladder and biliary tract (24–40.7%); by sphincter Oddi spasm at functional discoordination (13–22%); by biliary hypertension at stenosis of the common bile duct distal part (12–20.3%); and by accompanying changes in the pancreatoduodenal zone (10–17%).

Though the pains at cystic anomalies of biliary ducts appeared to be a constant sign, their participation in diseases of biliary tracts in a number of cases has allowed to suspect only occurrence of jaundice. The yellowness of skin, mucosa and sclera appeared to be the secondary in relation to frequency and basic feature in relation to value at diagnosis of the cystic anomalies of the biliary ducts. This sign was observed in 49 (64.5%) from 76 patients with CDEHBD. The fast development of jaundice after pain syndrome was noted in 13 patients mainly at the age to 3 years. The appearance of jaundice in various terms after onset of the pain syndrome did not exclude in the pathogenesis of its development the role of discoordination of sphincter Oddi, which spasms can arise under effect of various unfavourable factors and express by pain syndrome with development of subsequent biliary hypertension in the further. The recurrent jaundice, presence of various duration of the “light interval”, short-term and big variability of icteric intensity during period of exacerbation indicated about predominance of the functional disorders of the sphincter Oddi in comparison with real stenosis. Cupping of the attacks with receiving of spasmolytics and analgesics

(18 patients) confirmed this assumption. This does not exclude an occasion stenosis in the terminal department of common bile duct. In 17 (34.7%) from 49 patients the damage of outflow of bile was caused by organic changes, that was specified by long jaundice, absence of effect from application of spasmolytics, by acute disorder of administration of the contrast substance into duodenum in intraoperative cholangiogram, by marked cholestatic changes in the liver in histological study.

Tumor neoplasm in the abdominal cavity was revealed in 12 (15.8%) from 76 children, in 7 — at classical triad. The cysts were palpated at a diameter more 3 cm. In some patients the increased liver masked the present tumorous mass. In other cases the palpating mass in the underhepatic space was accepted as increase of organ. In 2 children of breast age during operation there have been found cystic mass of volume from 1000 up to 2000 ml., occupying all underhepatic space with pushing away of the adjacent organs. Despite of the huge cyst sizes in these patients there were not found signs of the mechanical jaundice. The absence of mechanical jaundice at cystic mass of the huge sizes indicates about congenital dilatation of the external biliary ducts without stenosis of the major duodenal papilla.

The simultaneous presence of all clinical signs (paroxysmal pains, jaundice, palpated tumorous mass) appeared to be so-called “classic triad» was noted in 7 (9.2%) patients. The intensity of all major clinical signs in the patients of this group may be explained by the significant sizes of cystic mass. However, frequency, sequence and degree of expressing of each sign of CDEHBD in patients was completely different.

Depending on a structure and sizes of cystic dilatation, its anatomic variants the character of complications and development of the postoperative period changed. The changes in the liver due to organ lesion in the intrauterine period or occurring complications at the late determination of diagnosis influenced on the development of cystic transformation of the biliary ducts. There were observed non-complicated (5) and complicated (71) forms expressed looking like compensated, subcompensated and decompensated progressing. In 22 patients in presence of the signs of persistent mechanical jaundice or ‘classic triad” there were observed various complications in the liver. Reactive pancreatitis was noted in 7 patients, choledocholithiasis — in 11, cholecystocholangitis — in 23 patients, pressing of the adjacent organs in the abdominal cavity with the cyst — in 1, rupture of the cyst — in 6 and suppuration of the cyst content — in 1 patient. The information about occurrence of cholangiocarcinoma in the remnant tissue of the common bile duct was single. In our observations the cyst malignization was not found.

### Conclusions

The clinical expressions and progressing of the cystic dilatations of the extrahepatic biliary ducts depend on the intensity of the inflammatory, functional disorders and organic changes in the biliary system, interrelations of the dilated common bile duct with pancreatic duct.

The most often clinical features of the cystic dilatations of the extrahepatic biliary ducts include abdominal pains (24–31.6%) and jaundice (14–18.4%) of various duration and intensity expressed separately or in a combination (26 – of 34.2%).

The polymorphy of clinical expressions induce significant difficulty in recognition of cystic dilatations of the extrahepatic biliary ducts in children. There are observed noncomplicated and complicated forms looking-like compensated, subcompensated and decompensated development.

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## Section 7. Mechanics

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### Analysis of fluid receding from cloth in contact zone of roller pairs

**Abstract:** The paper provides fluid receding from moisture cloth in taking account geometry of contact zone, it is considering the moving between rotating rollers, when rollers have equal radiuses. It's defined location of the cloth element statement center with taking into account changes of pores and fluid capacities in element of cloth.

**Keywords:** Roller pairs, Contact zone, List material processing.

There are different approaches on investigating the movement of cloth, which includes fluid components clamped between moving rollers.

Problems perfecting of obtaining and design new technological process of handling materials and creating rolling machines' optimal constructional closely connected with geometrical, kinematical and dynamical laws process [1–5].

First contact's problem interacts of cylinders and cylinder with flatness is solved by G. Gers in static. On determination was accepted condition, that, materials contacting bodies of homogeneity and isotropic, deformation of absolute elastic bodies and amenable to the Hooke's law, bulk of contact's area is less than comparing with sizes of rolls. On these conditions normal efforts are shared by the contact's surface by the law of elliptical. Providing that, in most practical problems, connected with handling by rolling pairs different materials, accepted prerequisites by solving contact problems are not be done. The material gets not only elastic, but plastic deformation also, dependence from pressure to have not itself character and not obey to Hooke's law. According with this, available laws sharing contact pressure in the rolling pairs with elastic covers differ from elliptic law [1].

Kinematical and dynamical characteristic's process of metal's rolling in different rolls is rather good explored. There are different accesses by investigating movement of material, clamped between rotating rolls and inclusive fluid components.

Results another studies [2; 3], show converse situation: moisture gets out from enter part of contact zone and in the exit part has a place of moisture imbibition with material from covered rolls. It is necessary to pay attention, that character of moisture moving off from material

and imbibition moisture with material covered rolls depends on material properties and mechanical parameters of pressing appliance.

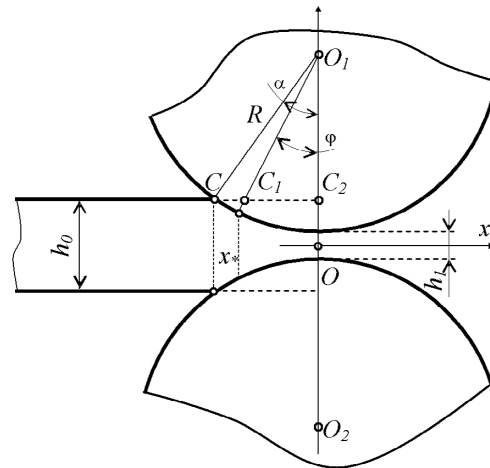


Fig. 1. Contact zone of roller pairs

It views receding of moisture cloth, which moving between rotating rollers, when rollers have the equal radiuses (fig. 1). Let when clamping angle —  $\alpha$  has thickness  $h_0$ , porosity  $n_0$  and free porosity, which not filled by fluid —  $n_1$ . Then the porosity filled by fluid is  $n = n_0 - n_1$ . The more cloth get in zone of deformation, the more expenditure of fluid will increase in entering zone  $x = -R \sin \alpha$ . In some period of time  $t = t_*$  front part of close will get position  $x = x_*$ , when in area  $-R \sin \alpha \leq x \leq x_*$  all pores will filled by fluid, after that ( $t > t_*$ ) fluid will be receded from deformation zone through entering

section. Since the area of deformation is symmetric concerning axis  $Ox$ , that possible examine movement of cloth only when  $y \geq 0$ . In this case equation of circle of roller on plane  $Oxy$  looks as following:

$$x^2 - \left(y - \frac{h_0}{2} - R \cos \alpha\right)^2 = R^2. \quad (1)$$

When  $x = 0$ ,  $y = \frac{h_1}{2}$ , where  $h_1$  — the least gap between rollers in zone of deformation. With putting values of  $x$  and  $y$  in to equation (1) we will find ratio  $h_0 = h_1$ ,  $h_0 - h_1 = 2R(1 - \cos \alpha)$ .

To resolve the equation (1) concerning  $y$  we will get following:

$$y = \frac{h_0}{2} + R \cos \alpha - \sqrt{R^2 - x^2}. \quad (2)$$

When  $t = 0$  location of point  $C$  (clamping moment) defines with coordinates  $C(-R \sin \alpha; \frac{h_0}{2})$ . In some period of time it gets

location  $C_1[-R \cos \alpha \operatorname{tg}(\alpha - \omega t); \frac{h_0}{2}]$ . It follows from the next

$O_1C_2 = R \cos \alpha$ ;  $C_1C_2 = O_1C_2 \operatorname{tg} \phi = R \cos \alpha \cdot \operatorname{tg}(\alpha - \omega t)$ . Taking into account that  $C_1$  lies in area  $x'' = 0$ , we will find location of  $C_1$ . Here  $\omega$  is angular velocity rotating of rollers.

Equation of straight line, which passing trough point  $O_1(0; \frac{h_0}{2} + R \cos \alpha)$   $C_1$  looks like following:

$$\frac{y - y_0}{y_1 - y_0} = \frac{x - x_0}{x_1 - x_0}. \quad (3)$$

From (3) moment of time  $t \in [0, \frac{\alpha}{\omega}]$ , putting  $x_0 = 0$ ,  $y_0 = \frac{h_0}{2} + R \cos \alpha$ ;  $x_1 = -R \cos \alpha \operatorname{tg}(\alpha - \omega t)$ ,  $y_1 = \frac{h_0}{2}$ , we will get:

$$y = \frac{x}{\operatorname{tg}(\alpha - \omega t)} + \frac{h_0}{2} + R \cos \alpha. \quad (4)$$

Coordinate  $x$  is a crossing with this straight line with circle could exist in equations (2) and (4).

Common capacity of cloth  $V_m$  when time  $t < t_*$  consists of fibers' capacity  $V_{fb}$ , pores capacity  $V_{por}$  and capacity of fluid  $V_f$ , which is in pores (porosity equal to  $n = n_0 - n_1$ ).

$$V_m = V_{fb} + V_f + V_{por}. \quad (5)$$

Distance, where front part of cloth will move in to the deformation zone during the time  $t$  consists of  $x_* = R[\sin \alpha - \sin(\alpha - \omega t)]$ .

Capacity of cloth with width "b" on that time defines with following:

$$V_m = bh_0R[\sin \alpha - \sin(\alpha - \omega t)]. \quad (6)$$

When capacity of pores disappear under pressure of rollers and the capacity value is zero, in deformation zone we will define time  $t_*$ . In this case from equation (5) follows that  $V_m = \frac{V_{fb}}{1 - n}$ ;

$$t_* = \frac{1}{\omega} \left\{ \alpha - \arcsin \left[ \sin \alpha - \frac{V_{fb}}{bh_0R(1 - n)} \right] \right\}.$$

Starting with time  $t = t_*$ , fluid starts recede from deformation zone until  $t = \frac{\alpha}{\omega}$ . Capacity which filled with fluid and fiber in moment of time  $t = t_*$ , in interval  $[-R \sin \alpha, x_*]$  is equal to

$V_* = 2by_*R[\sin \alpha - \sin(\alpha - \omega t)]$ . The capacity of pores which is not filled with fluid defines with following equation:

$$V_{por} = 2b \left\{ \int_{-R \sin \alpha}^{-R \sin(\alpha - \omega t)} y dx - 2y_*R \cos \frac{2\alpha - \omega t}{2} \sin \frac{\omega t}{2} \right\} n_1.$$

It comes from  $\frac{V_{por}}{V_{por} + V_{fb}} = n_1$  or  $V_{por} = n_1(V_{por} + V_{fb})$ . According to equation (2) it follows next:

$$V_{por} = n_1 b R^2 [\omega t_* + 4 \cos(\alpha - \omega t_*) \sin \frac{\omega t_*}{2} \cos \frac{2\alpha - \omega t}{2} + \sin \alpha \cos \alpha - \sin(\alpha - \omega t_*) \cos(\alpha - \omega t_*)]. \quad (7)$$

In order to define statement center  $x_c$  of cloth we should find center for  $x \in [-R \sin \alpha, x_*]$ . The square of the cloth in this area defines with equation (7).

$$S_1(t_*) = 2 \int_{-R \sin \alpha}^{-R \sin(\alpha - \omega t_*)} y dx = 2R(h_0 + 2R \cos \alpha) \cos \frac{2\alpha - \omega t_*}{2} \sin \frac{\omega t_*}{2} + R^2 [\omega t_* + \sin \alpha \cos \alpha - \sin(\alpha - \omega t_*) \cos(\alpha - \omega t_*)].$$

Than it is possible to calculate of statement center of that area with following equation:

$$\begin{aligned} x_{C_1} &= \frac{2}{S_1(t_*)} \int_{-R \sin \alpha}^{-R \sin(\alpha - \omega t_*)} y dx \cdot \int_0^{y(x)} dx = \\ &= \frac{R^2}{S_1(t_*)} \left( \frac{h_0}{2} + R \cos \alpha \right) [\sin^2(\alpha - \omega t_*) - \sin^2 \alpha] + \\ &+ \frac{2R^3}{3S_1(t_*)} [\cos^3(\alpha - \omega t_*) - \cos^3 \alpha]. \end{aligned}$$

Starting with  $t > t_*$  front part of clothes element moves to direction  $x > x_*$ . The area of movement of this part defines in interval  $x \in [x_*, R \sin(\alpha - \omega t)]$  for all  $t \in [t_*, \frac{\alpha}{\omega}]$ . In this interval the square

of clothes element determines with  $S_2(t) = 2 \int_{-R \sin(\alpha - \omega t)}^{-R \sin(\alpha - \omega t)}$ . Statement center of cloth element defines with following equation:

$$\begin{aligned} x_{C_2} &= \frac{2}{S_2(t)} \int_{-R \sin(\alpha - \omega t)}^{-R \sin(\alpha - \omega t)} xy(x) dx = \\ &= \frac{R^2}{S_2(t)} \left( \frac{h_0}{2} + R \cos \alpha \right) [\sin^2(\alpha - \omega t) - \sin(\alpha - \omega t_*)] + \\ &+ \frac{2R^3}{3S_2(t)} [\cos^3(\alpha - \omega t) - \cos^3(\alpha - \omega t_*)]. \end{aligned}$$

General center of statement of two areas  $x \in [-R \sin \alpha, x_*]$  and  $x > x_*$  when  $t < \frac{\alpha}{\omega}$  defines with:

$$x_c = \frac{x_{C_1} S_1(t_*) + x_{C_2} S_2(t)}{S_1(t_*) + S_2(t)}. \quad (8)$$

With putting  $S_1(t_*)$ ,  $x_{C_1}(t_*)$ ,  $S_2(t)$ ,  $x_{C_2}(t)$  into (8), we will get equation where it allows to find velocity and acceleration of statement center in area of deformation.

Determined formulas will let to define main parameters moisture cloth receding in contact zone of roller pairs. As parameters normal and tangential reactions in the contact zone of rollers varies depending of time.

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## Dynamic model of the inertial hydrodifferential transformer working process of the rotating moment in various automatic machine drives

**Abstract:** Working process of the inertial hydrodifferential transformer of the rotating moment of infinitely variable transmission is investigated. Dynamic mathematical model for the 4 mass system with gidrodifferentsialyis prepared. The equations are solved using the method of final differences, and the calculation algorithm is proposed.

**Keywords:** mechanical infinitely variable transmission; inertia moment; power drive; inertial hydrodifferential transformer; dynamic mathematical model.

The development of contemporary mobile technics is based on the aspiration to create and apply the infinitely variable transmission that could provide machines with specific advantages, namely increase in average movement speed and decrease in fuel consumption. On application of automatic infinitely variable transmission, the work of the driver could therefore be also considerably facilitated.

To our knowledge, currently the mechanical infinitely variable speed transmission within inertial-pulse regulation is promising for a number of inherent advantages such as automaticity and infinite speed and torque control to the driving wheels of the machine with high lifting efficiency, the ability to protect the motor against overload, simplicity and ease of operation [1, 21–22].

However, this type of transmission has not been widely used in the industry due to the failure of the rectifier inertial torque via depreciation and fracture of freewheel mechanisms. In order to improve the reliability of transmission, there has been implemented the development of original scheme of hydrodifferential rectifier moment, where hydraulic fluid is used for wedging, and two hydraulic machines are permanently fixed by the use of differential series, which simplifies the design of the hydraulic valves.

We investigate the workflow of hydraulic differential transformer of infinitely variable speed transmission inertial torque.

The dynamic mathematical model for 4-mass system with hydraulic differential is modelled as:

$$\begin{cases} A_1\ddot{\varphi}_{21} - A_2\ddot{\varphi}_{23} - A_3(\dot{\varphi}_{21} - \dot{\varphi}_{23})^2 + A_4\varphi_{23}^2 = M_a; \\ A_2\ddot{\varphi}_{21} - A_3\ddot{\varphi}_{23} + A_4\dot{\varphi}_{21} = -J_1M_{T1} \pm M_1; \\ J_2\left(\frac{\ddot{\varphi}_{21}(1+k) - \ddot{\varphi}_{23}}{k}\right) = -J_2M_{T2} \pm M_2; \\ J_1\dot{\varphi}_1 = -M_c \pm M_1 \pm M_2. \end{cases} \quad (1)$$

From equation (1) we see that the links between the first equation to the second and the links between third equations of the fourth equations are independent. They will be solved independently. While solving (1) within the second two equations, we find  $\varphi_1, \varphi_2$ . Here we solve simultaneous equations based on (1) the first two ones.

The solutions of other two equations are a little bit complicated. We remove squares.

$$\begin{cases} A_1\ddot{\varphi}_{21} - A_2\ddot{\varphi}_{23} - A_3\dot{\varphi}_{21}^2 + 2A_3\dot{\varphi}_{21}\dot{\varphi}_{23} - A_3\dot{\varphi}_{23}^2 + A_4\varphi_{23}^2 = M_a; \\ A_2\ddot{\varphi}_{21} - A_3\ddot{\varphi}_{23} + A_4\dot{\varphi}_{21} = -J_1M_{T1} \pm M_1. \end{cases}$$

From the square of the member system for writing a multiplication and consider the first term permanent.

While considering the first term we receive the following issues:

$$\begin{cases} A_1\ddot{\varphi}_{21} - A_2\ddot{\varphi}_{23} - A_3\dot{\varphi}_{21}\dot{\varphi}_{21} + 2A_3\dot{\varphi}_{21}\dot{\varphi}_{23} - A_3\dot{\varphi}_{23}\dot{\varphi}_{23} + A_4\varphi_{23}^2 = M_a; \\ A_2\ddot{\varphi}_{21} - A_3\ddot{\varphi}_{23} + A_4\dot{\varphi}_{21} = -J_1M_{T1} \pm M_1. \end{cases}$$

For the zero-order approximation:  $\varphi_{ij} = 1, \dot{\varphi}_{ij} = 1$ :

$$\begin{cases} A_1\ddot{\varphi}_{21} - A_2\ddot{\varphi}_{23} - A_3\dot{\varphi}_{21} + 2A_3\dot{\varphi}_{23} - A_3\dot{\varphi}_{23} + A_4\varphi_{23} = M_a; \\ A_2\ddot{\varphi}_{21} - A_3\ddot{\varphi}_{23} + A_4\dot{\varphi}_{21} = -J_1M_{T1} \pm M_1. \end{cases}$$

We describe the vector matrix:

$$\bar{A} = \begin{vmatrix} A_1 - A_2 \\ A_2 - A_3 \end{vmatrix}, \bar{B} = \begin{vmatrix} -A_3A_3(2-1) \\ A_40 \end{vmatrix}, \bar{C} = \begin{vmatrix} 0A_4 \\ 00 \end{vmatrix},$$

$$\bar{F} = \begin{vmatrix} M_a \\ -J_1M_{T1} \pm M_1 \end{vmatrix}, \Psi = \begin{vmatrix} \varphi_{21} \\ \varphi_{23} \end{vmatrix}.$$

The equation approximation are the following:

$$A\ddot{\Psi}^k + B\dot{\Psi}^k + C\Psi^k = F,$$

where  $k$  — approximation coefficient.

We estimate the equations for the zero approximation, within  $k = 0$ .

$$A\ddot{\Psi}^k + B\dot{\Psi}^k + C\Psi^k = F. \quad (2)$$

While considering zero approximation, within  $k = 1$ :

$$\begin{cases} A_1\ddot{\varphi}_{21} - A_2\ddot{\varphi}_{23} - A_3\dot{\varphi}_{21}^0\dot{\varphi}_{21}^1 + 2A_3\dot{\varphi}_{21}^0\dot{\varphi}_{23}^1 - \\ - A_3\dot{\varphi}_{23}^0\dot{\varphi}_{23}^1 + A_4\varphi_{23}^0\varphi_{23}^1 = M_a; \\ A_2\ddot{\varphi}_{21} - A_3\ddot{\varphi}_{23} + A_4\dot{\varphi}_{21} = -J_1M_{T1} \pm M_1. \end{cases}$$

Term of the equation is considered to be permanent:

$$A_3\dot{\varphi}_{21}^0, 2A_3\dot{\varphi}_{21}^0, A_3\dot{\varphi}_{23}^0, A_4\varphi_{23}^0.$$

The matrix is the following:

$$\bar{B} = \begin{vmatrix} -A_3\dot{\varphi}_{21}^0(2A_3\dot{\varphi}_{21}^0 - A_3\dot{\varphi}_{23}^0) \\ A_40 \end{vmatrix}, \bar{C} = \begin{vmatrix} 0A_4\varphi_{23}^0 \\ 00 \end{vmatrix}.$$

Thus:

$$A\ddot{\Psi}^1 + B\dot{\Psi}^1 + C\Psi^1 = F. \quad (3)$$

$$|\Psi^0 - \Psi^1| \leq \varepsilon; \quad (4)$$

$$|\Psi^1 - \Psi^2| \leq \varepsilon.$$

If the condition (4) is satisfied, then the problem is solved.

$\Psi^0$  obtain a solution for  $\varphi_{ij} = 1, \dot{\varphi}_{ij} = 1, \Psi^0 = \begin{vmatrix} \varphi_{21}^0 \\ \varphi_{23}^0 \end{vmatrix}$ .

Considering the power load in 3 modes: engine acceleration  $F_1 = F^{(1)}$ , engine at maximum loadings  $F_2 = F^{(2)}$  and engine braking  $F_3 = F^{(3)}$ .  $J = 1, 2, 3$ .



We investigate the force loading the engine acceleration, starting at 0 and extending to  $k$ :

$$\begin{aligned} A\ddot{\Psi} + B^0\dot{\Psi} + C^0\Psi &= F_1; \\ A\dot{\Psi} + B^1\Psi + C^1\Psi &= F_1; \end{aligned}$$

$$A\ddot{\Psi} + B^k\dot{\Psi} + C^k\Psi = F_1.$$

The equation should meet the conditions:

$$|\Psi^k - \Psi^{k-1}| \leq \varepsilon^k.$$

This equation can be solved by finite differences of the second order of accuracy. Approximating  $\Psi$ :

$$\dot{\Psi} = \frac{1}{2\tau}(\Psi_{i+1} - \Psi_{i-1}); \quad \ddot{\Psi} = \frac{1}{\tau^2}(\Psi_{i+1} - 2\Psi_i + \Psi_{i-1}).$$

$$\frac{A}{\tau^2}(\Psi_{i+1} - 2\Psi_i + \Psi_{i-1}) + \frac{B^k}{2\tau}(\Psi_{i+1} - \Psi_{i-1}) + C^k\Psi_i = F_i^{(1)}.$$

This equation is multiplied by time steps  $\tau^2$ :

$$\left(A + \frac{B^k}{2}\tau\right)\Psi_{i+1} - (-2A + C^k\tau^2)\Psi_i + \left(A - \frac{B^k}{2}\tau\right)\Psi_{i-1} = \tau^2 F_i^{(1)}.$$

Considering:

$$A^k = \left(A + \frac{B^k}{2}\tau\right); \quad B^k = (-2A + C^k\tau^2); \quad C^k = \left(A - \frac{B^k}{2}\tau\right).$$

The total equation takes the form:

$$A^k\Psi_{i+1} - B^k\Psi_i + C^k\Psi_{i-1} = \tau^2. \quad (5)$$

Solving equation (5) relative to  $\Psi_{i-1}$ ,  $1 \leq i \leq 3$ :

$$\Psi_{i-1} = (A_1^k)^{-1} [\tau^2 F_i^{(1)} + B_1^k \Psi_i - C_1^k \Psi_{i-1}]. \quad (5^1)$$

Under the initial conditions  $i = 0$ :

$$\Psi_1 = (A_1^k)^{-1} [\tau^2 F_0^{(1)} - B_1^k \Psi_0 - C_1^k \Psi_{-1}].$$

Considering:

$$\begin{cases} \dot{\Psi}_0 = \alpha; \quad \Psi_0 = \beta; \quad \frac{1}{2\tau}(\Psi_1 - \Psi_{-1}) = \alpha; \quad \Psi_1 = \beta; \\ (\Psi_1 - \Psi_{-1}) = 2\tau\alpha; \quad \Psi_{-1} = \Psi_1 - 2\tau\alpha. \end{cases} \quad (6)$$

While considering the initial conditions (6):

$$\Psi_1 = (A_1^k)^{-1} [\tau^2 F_0^{(1)} + B_1^k \beta - C_1^k (\Psi_1 - 2\tau\alpha)];$$

$$(E + (A_1^k)^{-1} C_1^k) \Psi_1 = (A_1^k)^{-1} [\tau^2 F_0^{(1)} + B_1^k \beta + 2\tau\alpha C_1^k],$$

where:  $E$  — matrixunit.

$$\Psi_1 = (E + (A_1^k)^{-1} C_1^k)^{-1} (A_1^k)^{-1} [\tau^2 F_0^{(1)} + B_1^k \beta + 2\tau\alpha C_1^k],$$

$i = 1$ :

$$\Psi_2 = (A_1^k)^{-1} [\tau^2 F_1^{(1)} - B_1^k \Psi_1 - C_1^k \beta].$$

Solving the equation (5) (beginning  $i \geq 1$ ):

Under  $k = 1$ ,  $\Psi_1^0$  — is determined,

Under  $k = 2$ ,  $\Psi_2^1$  — is determined;  $|\Psi_i^1 - \Psi_i^0| < \varepsilon$ ,

Under  $k = 3$ ,  $|\Psi_i^2 - \Psi_i^1| < \varepsilon$ ,

Under  $k = k - 1$ ,  $|\Psi_i^k - \Psi_i^{k-1}| \leq \varepsilon$ ,

$i = N$ :

$$\Psi_N^0 = (A_1^k)^{-1} [\tau^2 F_{N-1}^{(1)} - B_1^k \Psi_{N-1} - C_1^k \Psi_{N-2}]. \quad (5^2)$$

Under zero approximation we assume:

$$\phi_{ij}^0 = 1, \quad \phi_{ij}^1 = 1. \quad (7)$$

$$B^{k-1} = \begin{pmatrix} -A_3 \phi_{21}^{k-1} & (2\phi_{21}^{k-1} - \phi_{23}^{k-1}) A_3 \\ A_4 & 0 \end{pmatrix}; \quad C^{k-1} = \begin{pmatrix} 0 & A_4 \phi_{23}^{k-1} \\ 0 & 0 \end{pmatrix}. \quad (8)$$

Using (8) we estimate the vector equation:

$$A\dot{\Psi}^k + B^{k-1}\dot{\Psi}^k + C^{k-1}\Psi^k = F_1. \quad (9)$$

Equation (9) is solved by finite differences of the second accuracy order:

$$\frac{A}{\tau^2}(\Psi_{i+1}^k - 2\Psi_i^k + \Psi_{i-1}^k) + \frac{B^{k-1}}{2\tau}(\Psi_{i+1}^k - \Psi_{i-1}^k) + C^{k-1}\Psi_i^k = F_i^{(1)}. \quad (10)$$

This equation is multiplied by  $\tau^2$  and similar summands are introduced:

$$\begin{aligned} \left(A + \frac{B^{k-1}}{2}\tau\right)\Psi_{i+1}^k + (-2A + C^{k-1}\tau^2)\Psi_i^k + \\ + \left(A - \frac{B^{k-1}}{2}\tau\right)\Psi_{i-1}^k = F_i^{(1)}\tau^2. \end{aligned} \quad (11)$$

We introduce the designations:

$$A_1^{k-1} = A + \frac{B^{k-1}}{2}\tau; \quad B_1^{k-1} = -2A + C^{k-1}\tau^2; \quad C_1^{k-1} = A - \frac{B^{k-1}}{2}\tau. \quad (12)$$

Taking into account the designations (12) we rewrite the equation (11):

$$A_1^{k-1}\Psi_{i+1}^k + B_1^{k-1}\Psi_i^k + C_1^{k-1}\Psi_{i-1}^k = \tau^2 F_i^{(1)}. \quad (13)$$

Equation (13) is solved under the function  $\Psi_{i+1}^k$ :

$$\Psi_{i+1}^k = (A_1^{k-1})^{-1} [\tau^2 F_i^{(1)} - B_1^{k-1}\Psi_i^k - C_1^{k-1}\Psi_{i-1}^k]. \quad (14)$$

Under  $i = 0$ , equation (14) obtains the form:

$$\Psi_1^k = (A_1^{k-1})^{-1} [\tau^2 F_0^{(1)} - B_1^{k-1}\Psi_0^k - C_1^{k-1}\Psi_{-1}^k]. \quad (15)$$

We formulate the initial conditions  $\dot{\Psi}_0^k = \alpha$ ;  $\Psi_0^k = \beta^k$ ;  $\dot{\Psi}_0^k$  — and approximate within the second order of accuracy.

$$\dot{\Psi}_0^k = \frac{1}{2\tau}(\Psi_1^k - \Psi_{-1}^k) = \alpha. \quad (16)$$

This equation is solved for  $\Psi_{-1}^k$ :

$$\Psi_1^k - \Psi_{-1}^k = 2\tau\alpha; \quad \Psi_{-1}^k = \Psi_1^k - 2\tau\alpha^k. \quad (17)$$

Phrases  $\Psi_{-1}^k$  and  $\Psi_0^k$  are substituted into the equation (15):

$$\Psi_1^k = (A_1^{k-1})^{-1} [\tau^2 F_0^{(1)} - B_1^{k-1}\beta^k - C_1^{k-1}(\Psi_1^k - 2\tau\alpha^k)]. \quad (18)$$

We introduce similar summands:

$$[E + (A_1^{k-1})^{-1} C_1^{k-1}] \Psi_1^k = (A_1^{k-1})^{-1} [\tau^2 F_0^{(1)} - B_1^{k-1}\beta^k + 2\tau C_1^{k-1}\alpha^k]. \quad (19)$$

From equation (19) we define  $\Psi_1^k$ :

$$\Psi_1^k = [E + (A_1^{k-1})^{-1} C_1^{k-1}]^{-1} (A_1^{k-1})^{-1} [\tau^2 F_0^{(1)} - B_1^{k-1}\beta^k + 2\tau C_1^{k-1}\alpha^k]. \quad (20)$$

Under  $i = 1$  and the entry conditions  $\Psi_0^k = \beta^k$  from the equation (14) we obtain:

$$\Psi_2^k = (A_1^{k-1})^{-1} [\tau^2 F_1^{(1)} - B_1^{k-1}\Psi_1^k - C_1^{k-1}\beta^k]. \quad (21)$$

Computer realization:

1. Basic data;
2.  $i = 0$ ;
3. The equation is solved (20);
4.  $i = 1$ ;
5. The equation is solved (21);
6.  $i = i + 1$ ;
7. The equation is solved (14);
8.  $i < N$ , if the condition is satisfied, then move to step 6. Otherwise to step 9;
9. End.

Thus, within the dynamic model we investigated working process of the inertial hydrodifferential transformer of the rotating moment of infinitely variable speed transmission. The equation (1) is solved by the method of finite differences; the algorithm of calculation is also formulated. Thus, using the equations (20) and (21) we can find the values of the movement in the first and second shaft of the inertial hydrodifferential transformer.

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## Section 8. Pedagogy

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### **Model of pedagogical support of primary school children with cognitive difficulties in studies by a special educational needs teacher**

**Abstract:** The article substantiates and structures the model of pedagogical support of primary school children with cognitive difficulties in studies by a special educational needs teacher in the conditions of a general education school.

**Keywords:** pedagogical support, cognitive difficulties in studies, model of pedagogical support by a special educational needs teacher.

In the conditions of the current change of socio-economic formations, education plays a special role and a significant attention is paid to the Concept of modernization of the Russian education. Modernization of education presupposes the orientation of studies to not only understanding of a certain amount of knowledge by the students, but also to the development of their personality, their cognitive and creational abilities, formation of an integral system of knowledge, competences, skills and experience of independent activity.

However, the lead goal of modernization of education to create a mechanism of sustainable development of the system of education cannot be solved without taking into account the state and abilities of a student's personality. Potential abilities of contemporary school children are often diverse: from giftedness, talent to weak performance, delay in development, difficulty in assimilating educational programs. Unfortunately, this diversity in the educational process of general education school has been typical for school children since its conception.

Modern situation in education requires a different conceptual approach, which is defined by the priority of socio-oriented, personal-pragmatist interaction at all levels of the system of complex help that could satisfy the students with cognitive difficulties in studies.

In the modern situation of development of a personality capable of successful adaptation in the modern world, the system of pedagogical support is gaining more popularity.

This article presents the model of pedagogical support of primary school children with cognitive difficulties in studies by a special educational needs teacher in the conditions of a general education school.

Organization of such support implies both, special pedagogical support of educational process and conduct of correctional-developmental classes. Pedagogical support presupposes active inclusion of the activity of a special educational needs teacher into all spheres of educational process.

In accordance with the goals and tasks of an educational institution, general goal and tasks of correctional-developmental work is determined; its basic provisions are formed; content and direction of the activity of the special educational needs teacher, aimed at the development of cognitive sphere, in the conditions of a general education school are specified; specific methods of the specialist's work with primary school children with cognitive difficulties in studies are used.

The efficiency of correctional-developmental work in the conditions of general education school is provided by a complex approach to its content, which allows determining individually-oriented methods of enhancement of cognitive development in children and formation of academic knowledge. The special educational needs teacher interacts with the specialists of the school psychological medical pedagogical council (hereinafter «PMPc») [4] (teacher, speech therapist, psychologist, doctor), school administration, parents with the purpose of development individual academic itineraries. Work with parents is an important aspect in this interaction.

Correctional-pedagogical work of the special educational needs teacher is built on the principles of the system of correction-developmental education. One should follow the following provisions while organizing it:

1. Complex approach to diagnostics, correction and rehabilitation.
2. Consideration of individual and age peculiarities of a child while organizing correctional-developmental work.
3. Inter-disciplinary interaction of the specialists.
4. Dynamic observation of the student's development.
5. Analysis of the condition of formedness of academic knowledge, abilities, skills and psycho-physical development of the child.

Considering the provision of timely specialized pedagogical support to the children with cognitive difficulties in assimilating the compulsory minimum of educational content in the conditions of the general education school as the main general goal of the activity of the special educational needs teacher, the solution of the following specific problems takes place:

- detection of unfavorable variants of cognitive development and definition of the student's certain educational difficulties;
- drafting of the individual educational itinerary of a child in the conditions of the interaction with PMPc specialists;
- detection of students with cognitive difficulties in studies to perform special correctional-developmental effect by the specialists: special educational needs teacher (educational and cognitive activity); speech therapist (speech activity); psychologist (emotional-personal development);
- detection of students who cannot be taught in the system of compensatory education (hereinafter CE) [3];

- dynamic study of the level of cognitive development by the students and results of correctional-developmental effect;
- monitoring of qualitative result of the selected program, form, methods and approaches of support compared to the real achievement and development level of the child;
- conduct of individual and group correctional-developmental classes ensuring the assimilation of program material and transfer of the skills and abilities formed at classes to the students' educational activity;
- consultation of teachers and parents on the problems of development, education and upbringing of children with cognitive difficulties in studies, selection of optimal form, methods and approaches of education and upbringing in accordance with individual peculiarities of the child.

The solution of set tasks is realized in the following directions of the work of the special educational needs teacher, which ensure a complex approach to its organization [2].

### 1. Diagnostic direction

The peculiarities of the present direction are: definition of the zone of «relevant» development (what the child does independently) and zones of «closest» development (what the child does with the help of an adult) in order to determine the prospects of the education; division of children with cognitive difficulties in studies into groups according to prevailing defect to conduct correctional-developmental work; dynamic monitoring of the child's development; definition of optimal conditions of individual development in the process of complex impact on the child.

Diagnostic direction of work includes: the stage of primary defect examination; systematic stage-by-stage observations of the dynamics and correction of the psychical development by the specialist; assessment of the correspondence of the selected program, methods and approaches of education to the real achievements and level of the child's development.

Based on the results of the primary defect examination, the students are divided into individual and group classes. Dynamic study of the students is conducted in order to detect the dynamics of the child's development, determine the correspondence of the selected forms, methods and approaches of education to the level of the student's development. In the process of the dynamic study, the task of differentiation of similar conditions of defects in development and determination of children, who are beyond the education in the classes of compensatory education, is also solved. Final diagnostics is performed twice a year (1<sup>st</sup> or 2<sup>nd</sup> week of December and May). The results obtained in the course of defect examination were discussed in the meetings of the school PMPc and recorded are a defect presentation of a student.

### 2. Correctional direction

Correctional direction of the work of the special needs education teacher is a system of correctional-developmental effect on the cognitive activity of the child with difficulties in studies.

The activity of the special needs education teacher is built taking into account age and individual peculiarities of the child depending on the structure of the defect and degree of its expression [1].

The main form of organization of defect-related work is group and individual classes. The number of children in a group varies from 2 to 7 depending on the degree of expression of a defect. Correctional-developmental classes are held by the special needs education teacher after school classes in the regime of an extended school day or non-school hours, taking into consideration the working hours of the school. Individual classes are held once a week during the period from the third week of September till the second week

of May; group classes are held once a week from the 1<sup>st</sup> of September till the 29<sup>th</sup> of May — 34 classes in total. The duration of group classes is 30–45 minutes, and individual classes — 20–45 minutes. The frequency and duration of classes is defined by the severity and character of a defect. Total load on the child in accordance with the work of other specialists is also taken into account. Classes are of correctional-developmental and subject-related nature.

### 3. Analytical direction

The necessity of this direction of work is determined by the need in a complex approach to the problems of the child, which presupposes:

- 1) the system analysis of personal and cognitive development of the child, which allows determining separate manifestations of the defect of psychical development of the child, determining the reasons of the defect, tracking their interrelation and inter-influence on one another [1];
- 2) creation of complex individual correctional-developmental programs aimed at interrelated development and correction of different sides of the child's cognitive development;
- 3) ensuring specialized support of the child's education and upbringing. In accordance with the main defect in the child, every student has a supervising specialist, who ensures the interrelation of directions in the correctional-developmental work of those specialists whose help the child requires;
- 4) prevention of overloads;
- 5) interaction of the specialists within the psychological medical pedagogical council.

Thus, this direction ensures inter-disciplinary interaction of the specialists in the work; allows tracking the efficiency of correctional-developmental effect and correct the programs of correctional-developmental classes in accordance with the child's achievement. The complex dynamic examination of children is conducted for this purpose (September–October and April–May). The results are discussed at the meetings of the school PMPc. According to the results of the council's work, the correctional-developmental work of the special needs education teacher with CE students is corrected (if required) and complex recommendations for parents and teachers are drawn.

### 4. Consultative-enlightening and preventive direction

It implies the support of teachers and parents of the students in the issues of upbringing and education of the child; preparation and inclusion of the parents in the solution of correctional-developmental tasks as well as the work on prevention of secondary and tertiary defects of development.

For this purpose, the special needs education teacher develops recommendations for parents and teachers in compliance with age and individual peculiarities of children, the state of their somatic and psychical health; additional examination of students is performed upon the request of parents and teachers; individual consultations and theme parent meetings, performances at teacher methodical unions are held.

Developed recommendations have private and general nature. Performances at meetings or methodical unions, where parents and teachers are explained about the peculiarities of a defect in detail precede such recommendations.

### 5. Organizational-methodical direction

This direction of the activity of the special needs education teacher includes the preparation and their participation in the councils, methodical unions, pedagogical councils, organization of documentation, if required, organization of the students' examination for the PMPc of the district (city, city quarter) to refer those who need it to special (correctional) institutions.

To participate in the council, a defect presentation is drafted by the special needs education teacher for every student, which includes basic diagnostically significant characteristics of the peculiarities of the child's development for the qualification of their defect.

The efficiency of pedagogical support of students with cognitive difficulties in studies by the special needs education teacher in the conditions of general education school is provided by a complex

approach to its content, which allows determining individually-oriented methods of enhancement of cognitive development in children and formation of academic knowledge. Children study in the classes of compensatory education, require the help of the special needs education teacher, the level of which depends on the peculiarities of the students. Some children require individual or group correctional-developmental classes and special support, other only need psychological-pedagogical support.

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## Section 9. Agricultural sciences

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### About the principles of water resource management in the farms of water user association (WUA)

**Abstract:** The article presents the results of experiments in the conditions of a new hydrographic principle of water resource management in the farms of water user association (WUA).

**Keywords:** water resources, farms, water user association, water use, hydrometric stations

The experience of water use management in the agrarian sector of the national economy of the Baltics and the CIS and countries of the far abroad indicates the advantage of water resource management by way of creation of water user association — WUA, which designs real conditions for the regulation of water relations in the farms [1].

Considering these circumstances, WUA «Shokh-aryk», where water use was organized according to hydrographic principle for the first time, conducted works on improvement, organization and management in the condition of limited water apportioning in 2004–2006. The layout of the fields was planned on the territory of 22 ha with the help of a laser installation. Regulating structures equipped with hydrometric stations were built at the water-removing points in 25 farms. Collector-drainage network of 12 km. was cleaned.

The composition and structure of irrigated areas on the territory of WUA «Shokh-aryk» are as follows: the total area of plough land was 840 ha. in 2004 and 670 ha. in 2005–2006; absolute weight of cotton plant was 17.8% and 22.4% respectively, and winter wheat — 5.9% and 8.9%. The share of other lands with prevailing sunflower, sesame, green gram fields as well as other cultures that bring extra profit to the farms is quite high and occupies 58.9–69.6% of the plough land.

According to hydro-module regionalization performed by the institute of Uzbek SRI of cotton science, the territory of WUA «Shokh-aryk» is primarily assigned to V and VI hydro-module regions with respective area of 35.6% and 24% of the total area.

11 679–12 284 thousand m<sup>3</sup> of water will be required during the years of studies in the conditions of recommended irrigative norms of cultivated cultures in WUA «Shokh-aryk» in the whole [2].

Due to the deficit of water resources, the water users have a limit based on the forecast water supply. The volume of the assigned limit is determined according to the following equation:

$$W_{\lambda} = W_p \times C_{ws},$$

where:  $W_{\lambda}$  — the volume of the assigned water limit, m<sup>3</sup>;

$W_p$  — the volume of required water according to the plan of water use at a farm, m<sup>3</sup>;

$C_{ws}$  — coefficient of water supply.

During the distribution of water limit assigned for water user association (WUA) «Shokh-aryk», the coefficient of water supply of 0.87 is accepted.

In the whole, in WUA «Shokh-aryk», the assigned water limit was 10 687 thousand m<sup>3</sup> in 2004 and 10 156 thousand m<sup>3</sup> in 2005 of the required one. There was annual schedule of water withdrawal for WUA and every farm for the purpose of timely supply of water to users.

The analysis of experience of water resource management based on administrative-territorial principle revealed significant violations of water use rules, unevenness of water distribution between water users. One of the reasons of this is untimely submission of a request for water by water users in WUA, and, consequently, by WUA to the Department of irrigational systems, i. e. unpreparedness of the farmers to a new form of water use.

Due to a timely submission of the request for water and systematic conduct of organizational-explanatory works among farmers-water users, the level of water supply under hydrographic principle of management increased significantly. Thus, during the period of 2005–2007 in the section of a hydrological year, the actual water supply in WUA «Shokh-aryk» increased from 94% to 99%, and during the clearing period — from 96% to 99% compared with the assigned limit of water.

The analysis of the results of distribution of assigned limit under the administrative-territorial principle in production conditions indicates the case of uneven distribution of water and impairment of the rights of water users primarily located in the low parts of the distribution network, where water supply accounted for only 74–80%. After the transition to hydrometric principle of distribution of assigned limit as well as due to the regulation of the order of water supply according to advance requests from farms, the level of water supply improved notably, and accounted for 90–100% regardless the location of water users relative to the source.

Summarizing the above stated, one can note that real prerequisites for target-oriented use of assigned water limit are created under the hydrographic principle of distribution of water resources. Organizational-managerial structure of WUA based on contractual relations and requirement of annual submission of a request depending on the composition and areas of cultivated cultures in the farms ensures quite high level of water distribution between water users. On the basis of this positive experience of organization of water use within assigned limit, we proposed the order and number of WUA under hydrographic principle of distribution of available water resources in the Republic of Karakalpakstan.

Table 1. – The level of water supply to water users depending on the location relative to the source (WUA «Shokh-aryk»)

Factitious division of water source along the length of the channel «Shokh-aryk»	Number of farms	Irrigated area, ha.	Level of water supply in %	
			Under administrative-territorial principle	After transition to hydrographic principle
Upper	10	525.0	97–100	95–100
Medium	11	564.3	95–100	94–100
Lower	5	240.0	74–80	90–100

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## Section 10. Technical sciences

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### Layout diagram of the hinged oscillatory spike-tooth harrow and determination of its row-spacing width

**Abstract:** In the article the layout diagram of teeth of hinged oscillatory spike-tooth harrow on the framework and the research results for substantiation of its row-spacing width are specified.

**Keywords:** Hinged oscillatory spike-tooth harrow, layout diagram of teeth on the framework, row-spacing width of teeth, the height of unprocessed combs, soil shearing by teeth.

A hinged oscillatory spike-tooth harrow has been developed by our side (furthermore a harrow) [1, 88]. It is applied for earlier spring and presowing soil harrowing for winter tillage, loosening the upper layers of soil after plowing and chiseling, demolition of chunks and crusts, weeds destruction.

A harrow consists of framework and working bodies, connected to each one another and hinged by the framework. In the process of work its working bodies will copy the uneven parts of the field surfaces and perform angular and vertical oscillations at the lateral-vertical and cross-sectional flats. In the result the soil crumbling quality will get improved, equality of its loosening deepness, young seedlings of weeds are more completely destroyed.

Figure 1 shows the layout diagram of the harrow teeth designed such that each tooth remained independent and throughout its widths of gripping groove were at the same distance from each other.

When the harrow is working the soil deformation zones at a depth of travel from the neighboring teeth will not be completely overlapped and therefore in the lower layers the unprocessed triangular shaped longitudinal combs are remained [2, 70–71], which form unevenness of the loosened bottom layer (Fig. 2).

As it was achieved the implemented experiments when the harrow is working the top part of combs is crumbled and its actual height  $\Delta h_o$  is less than the theoretical  $\Delta h$ , i. e.:

$$\Delta h_o = \Delta h K_h = \frac{a}{2} K_h \text{ctg} \psi, \quad (1)$$

where:

$K_h$  — coefficient which considers the decreasing of current height of combs;

$a$  — width of teeth row-spacing;

$\psi$  — an angle of lateral shearing of the soil.

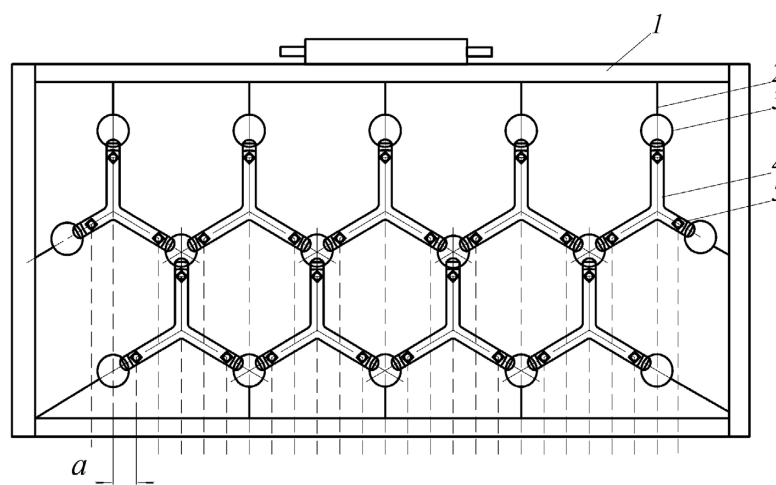


Fig. 1. Layout diagram of the teeth of hinged oscillatory harrow:  
1 – framework; 2 – draught; 3 – ring; 4 – working body; 5 – tooth

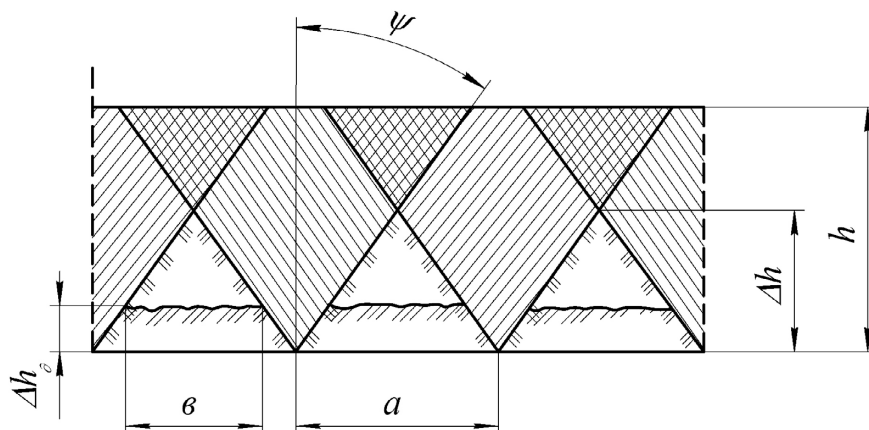


Fig. 2. The determination diagram of row-spacing teeth width

The value of  $K_h$  coefficient is determined as the ratio of actual height of the combs  $\Delta h_o$  to the theoretical  $\Delta h$ , that is as following:

$$K_h = \frac{\Delta h_o}{\Delta h} = \frac{2\Delta h_o}{a} \operatorname{tg}\psi. \quad (2)$$

The implemented experiments in the period of earlier spring harrowing of the plowed fields at movement velocities from 1.2 to 2.0 m/s show, that depending on the movement velocity the coefficient value  $K_h$  varies within the range of 0.26–0.30. In this case, by increasing the movement velocity the coefficient value  $K_h$  decreases. It occurs mainly at the account of increasing the velocity of refused soil pieces dropping aside by the harrow teeth.

As, the developed harrow mainly is used in the soil preparation for sowing proceedings, the height of processing bottom unevenness must not exceed the allowed value  $[\Delta h_{aux}]$ , that means the following:

$$\Delta h_o \leq [\Delta h_{aux}]. \quad (3)$$

This condition, as follows from the term (1), there may be satisfied at the account of changing the values  $a$  and  $\psi$ . However, an angle of the lateral soil shearing, basically depends on its physical-

mechanical properties and depending on the teeth parameters it changes to a several margins. Therefore more efficient allowed height of combs can be achieved at the account of changing the teeth row-spacing width teeth.

By applying the terms (1) and (3), there may be determined maximum allowable width of row-spacing teeth ensuring the condition (3):

$$a_{max} = \frac{2}{K_h} [\Delta h_{aux}] \operatorname{tg}\psi. \quad (4)$$

This formula allows to determine the value  $a$ , at which the bottom ridgeness of the loosened layer doesn't exceed the allowed margin.

By putting into the formula (4) the digital values of an angle of the lateral soil shearing ( $32^\circ$ ), allowable height of combs (1 cm.) as well as determined values of coefficient experimentally  $K_h$  (0.26–0.30), let's determine that:

$$a = 42 - 48 \text{ mm}.$$

Thus, in effort to ensure acceptable ridgeness of the soil layer loosened by the harrow the maximum value of width of the soil teeth row-spacing should be 48 mm.

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## Rationale for the parameters of the rotary tiller of new implement for volumetric presowing of ridges

**Abstract:** This paper presents the results of research on the justification diameter and number of planks tapered roller rotary tiller new instrument for pre-processing of the ridges and the vertical load on it.

**Keywords:** a instrument for processing of the ridges, frame with lifting gear, ripping claw, rotary ripper, ripper teeth, diameter and number of strips of the conical roller, vertical load on the rotary tiller, working depth.



It was developed the level of inventions developed a new instrument for pre-processing of the ridges, for the treatment of ridges along the entire profile before sowing [1, 48; 2, 53–54; 3, 176]. It consists (Fig. 1) of a frame with lifting gear, ripper tines set them rotating and tooth ripper. Loosening legs rigidly connected to the frame, and the rotary rippers and teeth — hinged respectively by means of parallelogram rods and spring loaded mechanisms.

In the process of loosening legs loosen the bottom of the furrows between the ridges, rotary tillers and teeth treated accordingly slopes and tops of ridges, bumps copying them. This ensures that the processing of ridges along the entire profile without flaws and creates a fine lumpy loosened layer that promotes the retention of moisture and the complete destruction of seedlings of weeds.

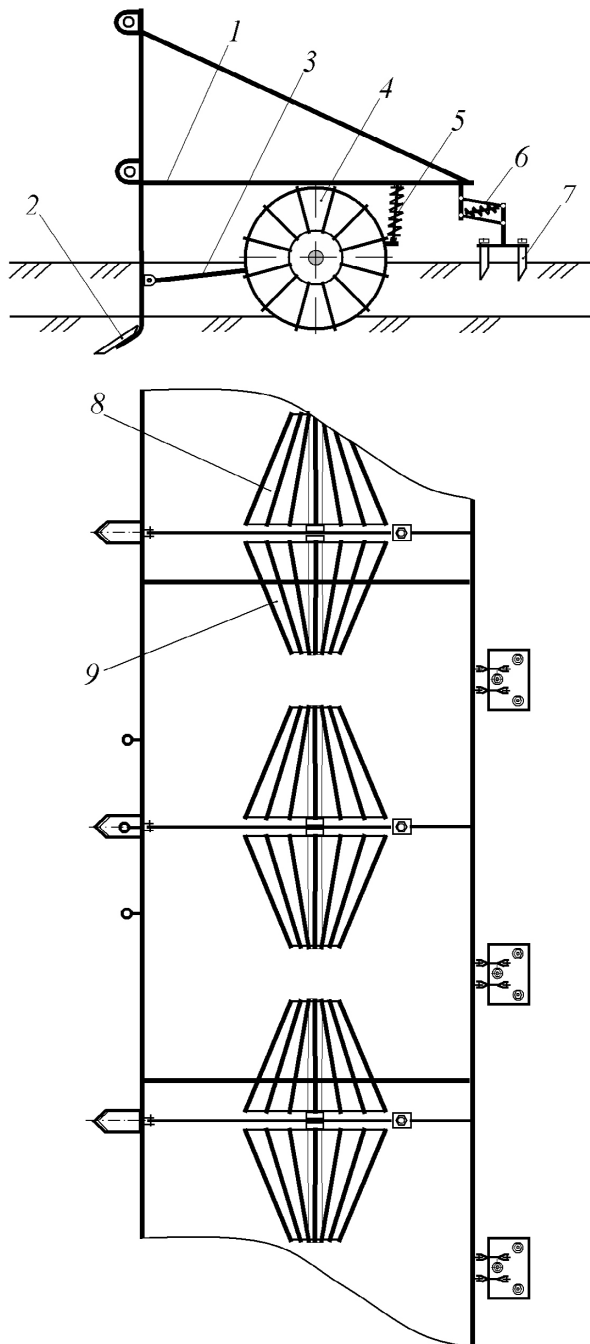


Fig. 1. Scheme of implement for volumetric presowing of ridges: 1 – framework with hung device; 2 – chisel point; 3 – connection rotary tiller; 4 – rotary tiller; 5 – spring guide rod; 6 – parallelogram mechanism; 7 – toothed ripper; 8, 9 – right and left tapered roller slat

The rotary tiller is designed implements from the right 8 and left 9 slatted conical rollers mounted on a common axis (Fig. 1), which in the process of manufacturing the slopes adjacent ridges.

This article presents the results of studies to determine the average diameter ( $D_z$ ) and the number of bars ( $n$ ) tapered roller rotary tiller and a vertical load ( $Q$ ) on it.

The average diameter of the tapered rollers is defined such that at a meeting with clods of soil are swept over them are not dragging them along [4, 40–41; 5, 232–233]. At the same time the following expression (Fig. 2):

$$D_z \geq \frac{d_k [1 + \cos(\phi_1 + \phi_2)] + 2h}{1 - \cos(\phi_1 + \phi_2)}, \quad (1)$$

where:  $d_k$  — diameter clods of soil encountered in the path conical roller slatted;

$\phi_1, \phi_2$  — respectively, the corners of the external and the internal friction of soil clods;

$h$  — depth of immersion slatted tapered rollers into the soil.

Number of planks tapered rollers is determined by the circumference of their large base such that at least one strap was in full contact with the ground, and the following expression:

$$n \geq 2\pi / \left( \arccos \frac{D_z + 0,5l \sin \varepsilon - 2h}{D_z + 0,5l \sin \varepsilon} \right), \quad (2)$$

where:  $l$  — length planks tapered roller rotary tiller, m;

$\varepsilon$  — angle of the slats tapered roller rotary tiller to the axis of rotation, deg.

When the condition (2) during the operation ensures a reliable rotation of the tapered rollers.

Using the diagrams shown in Fig. 2, defined vertical load on the rotary tiller, which provides its penetration to a predetermined machining depth.

For immersion rotary tiller to a predetermined depth processing of vertical load  $Q$  applied to it, must be equal to the sum of the vertical components of the normal  $N_1$  and  $N_2$  are the forces acting on its strap roller, i. e.:

$$Q = 2(N_1 + N_2 \cos \tau) \cos \varepsilon, \quad (3)$$

where:  $\tau$  — angle between adjacent slats roller rotary tiller.

The normal force acting on the plank tapered roller rotary tiller can be determined by the following expressions:

$$N_1 = \sigma_1 l t, \quad (4)$$

and:

$$N_2 = \sigma_2 l t, \quad (5)$$

where:  $\sigma_1$  and  $\sigma_2$  — specific soil pressure on the strap roller rotary tiller;  $t$  — the thickness of the planks tapered roller rotary tiller.

Expressing  $\sigma_1$  and  $\sigma_2$  in (4) and (5) through the coefficient of volume collapse  $q_0$  soil predetermined depth  $h$  [4, 14–15; 6, 132–133], and considering that,  $\tau = \frac{360^\circ}{n}$ , we get:

$$N_1 = q_0 h l t, \quad (6)$$

and:

$$N_2 = q_0 \left[ h - 0,5D_z \left( 1 - \cos \frac{360^\circ}{n} \right) \right] l t. \quad (7)$$

Given these expressions, the expression (3) is as follows:

$$Q = 2q_0 \left\{ h + \left[ h - 0,5D_z \left( 1 - \cos \frac{360^\circ}{n} \right) \right] \cos \frac{360^\circ}{n} \right\} l t \cos \varepsilon. \quad (8)$$

Calculations made by the formulas (1), (2) and (8)  $d_k = 0.1$  m.,  $h = 0.05$  m.,  $\phi_1 = 30^\circ$  and  $\phi_2 = 45^\circ$ ,  $q_2 = 3 \cdot 10^6$  N/m<sup>3</sup>,  $l = 0.32$  m.,  $t = 0.006$  m. and  $\varepsilon = 30^\circ$  [4, 14–15; 5, 164–166; 7, 22–23; 8, 121–122] showed that the average diameter of the conical rotary tiller slatted rollers should be at least 30 cm., the number of bars — at least 12 units and the vertical load on it — 0.74 kN.

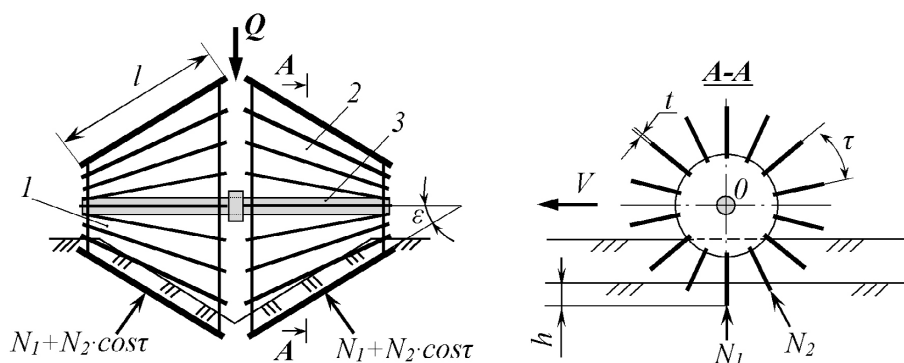


Fig. 2. The scheme to determine the vertical load on rotary tiller:  
1, 2 – left and right slatted tapered rollers; 3 – common axis

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## Usage of intellectual devices in defining structure and features of strewable substances

**Abstract:** In this article scientific-methodological bases of measuring electro-physical dimensions of grain products are investigated, which reflect primary producing structure and features of grain products — conceptions, principles, ways and algorithms of counting that provide demanded reliability, cooperativeness and exactness of technological information, projecting and implementing of measuring means.

**Keywords:** grains, humidity, converter, qualities, hydrometer, dielectric.

Satisfying people’s demands for food much more abundantly and improving supplement in this field completely are considered as one of the most important issues as economic reforms are fulfilling successively nowadays. For implementing these tasks successfully, we should pay attention to important duties, especially such as preserving and reproducing grain products.

People usually grow grain products in rainy spring and hot summer days. Therefore, we cannot supply people with grain products without organising to gather harvest of these products and to preserve them appropriately in order not to waste them. As the quantity of growing grain products is increasing, the ways of preserving and

reproducing them are developing; new modern stores and reproducing factories are building simultaneously.

Wasting grain products can be diminished quite considerably, if growing, transporting, keeping and reproducing grain products are implemented with the help of achievements of science and technology, and, of course, advanced experience, which has been held all over the world until now [1].

According to the information of international organization of agriculture, the amount of squandering grain products is not more than 6–10 percent all over the world. It is one of the important tasks in to diminish this amount 1–2 percent year by year.

Achievements of several subjects and fields as chemistry, physics, biology, biochemistry, biotechnology, physiology of plants, agro-chemistry, microbiology, study of vegetables, protecting plants are being used inefficiently for keeping grain products for a long period.

There are two main tasks of this research:

- to investigate theoretical bases of technologies of preserving and reproducing grain products;
- to develop main ways of preserving and reproducing them regularly.

Scientific researches in this field are devoted to important issues like leading all processes of this field in scientific way, improving the quality of products, avoiding from wasting them, preserving and reproducing grain products.

Strewable grain substances are main sources of raw materials, half-ready products and ready products in the branches of industry such as producing food products, preparing fodder and reproducing grain. Till these days the control of technological processes, which these substances take part in, have been implementing in some difficult ways that take much time to get effective and objective information in this field. Besides, we should use expressive methods in reproducing fields of agro-industrial complex to automate complicated technological processes of exchanging heat and weight in treating raw materials with moisture and heat; to supply sufficient effectiveness that is taken from imposing modern structures of managing and automatic controlling, which effect to quality indicators of ready products; to analyse electro-physical features of strewable grain substances in agriculture [2].

We should mention that there are still many losses in industry producing, because we do not have devices, which can define electro-physical parameters of grain products (especially the moisture of strewable substances) expressively, reliably and exactly. However, we should mention separately that, devices of controlling electro-physical parameters of grain products automatically have advantages; their advantages are felt in the usage of methods that have exactness and expressiveness.

The demand for automatic measuring devices is felt intensely in the process of operative measuring compactness, moisture, granulometrical content, the degree of pollution, dielectrical absorbency of strewable substances in stores and silos, also the quality of food raw materials and ready products in automatic analysators. Absolute and sometimes opposite requirements are put in front of these devices for exactness, expressiveness and reliability of continuous working in technological conditions of complex producing [2; 4].

The issue of forming automatic structures of analysing the features of strewable substances requires solving some difficulties, among them the most common and important one is to find out the most effective ways of changing that is measured firstly for signals of proportional exit of electro-physical features of substances, which is to be controlled automatically. The results help to achieve exactness, expressiveness and reliability of the process of changing that is measured; besides, this issue demands supplying with equipment for fulfilling the most efficient methods, which can be base of reliable and appropriate working of measure devices in a field condition — one of the most difficult conditions in producing.

The experiments showed that we cannot supply increasing demands for diminishing expenditure of energy, which is spent to improve the quality of agricultural products and preserve them for a long time in new economic conditions, to reproduce and transport them in industry, without starting the usage of modern technological and informational measuring base that reflects the automated structure of leading technological processes and producing.

Therefore implementing the methods of automatic measuring the electro-physical features of grain products (we should pay attention that they are plants), and supplying the automated structure of leading technological processes and producing with modern devices are considered as an important scientific-technical issues. Less attention has been paid to technical and scientific issues in solving difficulties in measuring moisture of grain and other strewable parts of plants: investigating the features of strewable substances as objects automatic controlling; learning the features of grain and seed, gathering, preserving, packing and transporting them; founding the types of devices and their metrological parameters which depends on industry producing conditions.

Investigating electrical features of grain products broaden the knowledge about the factors that affect to their electrical features, and it gives an opportunity to develop the methods of accounting the structure of measuring moisture and measuring the parameters of primary changers, which help to minimize the mistakes of measuring moisture.

The advantages of electric methods of controlling are considered to be felt in using the methods that have high frequency. Creating the structure (which has high frequency) of analysing the features of strewable substances requires solving the following tasks:

- to find out ways of changing control of substances into electrical signals that can help to achieve exactness and expressiveness;
- to supply optimal method with devices, which makes measuring device work reliably in the conditions of producing.

In this scientific article the future of analysing the state of the ways and means of measuring the moisture of strewable substances and creating measure means that use indicators of capacity is investigated. Moreover, here the issue of improving the parameters of measuring electrical features of grain products, which can change completely, is studied.

The task of projecting ways of improving the changers, which measure electrical features of grain products, is defined in the group of indicators of capacity that have high exactness of rechanging the parameters, which can substitute equivalent electrical patterns.

In some projects capacity indicators, which substance is put in them, are given as a pattern with two elements, so it cause some mistakes because of the parameters that are not counted. Therefore, we need to rechange the parameters of two-poled chain that has many elements, and of course to get exact information about the parameters of capacity indicators that have many quantities [3].

It was noticed that the most effective method is to influence impulsively to an active pattern, which has operative intensifier (OI), and to change parameters invariantly. Structure of measuring is usually given as an integral-differential formula and it is the base of pattern topology. It includes operators  $(\Phi(p; \Pi(X, Y); \Pi_0))$  which are marked with a base pattern that defines nomenclature and relativeness of the parameters of capacity indicators and conformity between influence of electricity to measuring structures (MS) and reaction against it:

$$A(\rho) = \Phi(\rho; \Pi(X, Y); \Pi_0) * \mathcal{E}(\rho). \quad (1)$$

In common case the exit signals of MS (amplitude, frequency, phase for an harmonic signal; spectral parts, quantity in a moment, character of changing or speed of changing — for an enharmonic signal) relate to several parameters of a capacity indicator. It conforms that we cannot solve the primary equation of changing with the parameters, which is searching, so it requires working on exit signals of indicators. We may analyse the algorithms of working on signals of MS using the theory of invariantness. There are two ways of supplying invariantness in this case.

The first way of supplying invariantness is a selective way; it needs to have one channel of changing. It implements particular operations with a member of the exit signal that has information about the parameters, which we are interested in.

If an informative member of the exit signal is defined as follows:

$$A_y(p) = \Phi_y(p; \Pi(Y); \Pi_0) * \Theta(p), \quad (2)$$

in this case  $K(p)$  — the operator of producing selective means should satisfy this condition:  $K(p) * A_y(p) = 0$ , in this condition  $A_y(p)$  — writing of an uninformative member of an exit signal in the form of operator;  $\Phi_y(p; \Pi(Y); \Pi_0)$  — the operator of MS which has uninformative parameters. Selection may be implemented with measuring degree and frequency of an exit signal, movements of its phases and spectral structure, the shape, time and changing speed of that signal.

The second way of supplying invariantness needs to have many channels. This way implements to increase the number of primary unsolvable equations more than the quantity of exact solvable equations with the help of forming extra independent equations, primary parameters of a capacity indicator are taken as their arguments. These equations may be results of extra-changing own parameters of MS with inserting one (or several) extra channels.

In the case of channels are asymmetric, exit signal of each channel has various operators in the field of its components. An operator form of writing internal signals  $\Theta_i(p)$  has following look:

$$\begin{cases} \Theta_1(p) = K_{1x}(p)A_x(p) + K_{1y}A_y(p); \\ \Theta_2(p) = K_{2x}(p)A_x(p) + K_{2y}A_y(p). \end{cases} \quad (3)$$

If  $K_{1y}(p) \equiv K_{2y}(p)$  and  $K_{1x}(p) \uparrow K_{2x}(p)$  are fulfilled we achieve the following:

$$\Delta\Theta = \Theta_1(p) - \Theta_2(p) = [K_{1x}(p) - K_{2x}(p)]A_x(p). \quad (4)$$

We may use this way practically only if channels are separated for some time.

We must implement  $L(p)$  changing on the informative member of the signal of MS with influencing to same channels asymmetrically:

$$\begin{cases} \Theta_1(p) = K(p)[L(p)A_x(p) + A_y(p)]; \\ \Theta_2(p) = K(p)[A_x(p) + A_y(p)]. \end{cases} \quad (5)$$

In this case:

$$\Delta\Theta = \Theta_1(p) - \Theta_2(p) = K(p)A_x(p)[L(p) - 1]. \quad (6)$$

The condition of implementing  $\Delta\Theta \neq 0$  and inserting  $L(p) \neq 1$  operator helps to solve (6) structure with inserting extra equations. Primary changing can be selective; in that case, primary changing of uninformative member of exit signal is implemented.

If we use many channelled way of supplying invariantness we may solve primary equation structure with inserting extra leading measure  $M_0(p)$ :

$$\begin{cases} \Theta_1(p) = K_{1x}(p)A_x(p) + K_{1y}(p)A_y(p); \\ \Theta_2(p) = K_{\text{док}}(p)E_2(p)M_0(p). \end{cases} \quad (7)$$

$$\Delta\Theta = K_{1x}(p)A_x(p) + K_{1y}(p)A_y(p) - K_{\text{док}}(p)E_2(p)M_0(p), \quad (8)$$

where:  $E_2(p)$  and  $M_0(p)$  are chosen using prior information about the member of uninformative exit signal of MS, as a result the following condition is to be fulfilled:

$$K_{1y}(p)A_y(p) - K_{\text{док}}(p)E_2(p)M_0(p) = \varepsilon \rightarrow \infty. \quad (9)$$

Usually ruling signals in  $E_2(p) = E(p)$  and DK is implemented by changing  $M_0(p)$  measure; controlling resistors or condensators, dividers of tension or digital-analogical changers are used as measurements.

Many factors influence on the exactness of dielcometric devices, which measures moisture, because control object  $\varepsilon$  is a complex function with many variables.

$$\varepsilon = f(W, T, G, H, P). \quad (10)$$

Here  $W$  is wetness,  $T$  is temperature,  $G$  is granulometrical content of a sample,  $H$  is chemical content of a sample,  $P$  is criterion of electro-chemical limit — “electrode-grain”.

In modern wetness measuring devices the influence of temperature on the results of measuring moisture is counted with the help of correction coefficient, in this case it is inserted to the last measuring results automatically or in a simple order. Granulometrical peculiarities of grain are not ideal, therefore the compactness of each quiver are different. That is why, results of measurements differs from each other. In modern wetness measuring devices, for diminishing the influence of sample's compactness, grain is compacted in quivers. The chemical content of grain sample depends on selection features. Calibrating (making accurate measurements) the sorts of agricultural plants, which has maximum peculiarities, is counted with inserting this in its curve form into the memory of microprocessors block or with complex sorting wetness measuring devices in tables and special calibration of this device before measuring. Besides, other factors influence of the chemical content of grain that cannot be forecasted, for example, various conditions, the content and features of soil, and weather. In some cases, using indicators is implemented for a particular plant with calibrating them.

Measuring results of dielectric absorbency  $\varepsilon$  depends on proportion of independent and dependent wetness. Moreover, present dielcometric wetness measuring devices are specified with module of complex dielectric absorbency of a sample:

$$|\tilde{\varepsilon}| = \frac{C_m}{C_0}. \quad (11)$$

In this formula:  $C_m$  — the amount of volume of quiver, which grain is placed in it, that is measured with wetness measuring devices;  $C_0$  — the volume of empty quiver.

The amount of  $C_m$  can be counted like this:

$$C_m = C_0 \times \varepsilon \sqrt{1 + tg^2 \delta}, \quad (12)$$

where:  $\varepsilon$  — relative dielectric absorbency of an experimenting material;  $tg\delta$  — tangent angled dielectric losses of experimenting sample grain.

In other words, results of measuring depend on tangent angled dielectric losses of material. At the same time, we can increase the exactness of dielcometric measuring moisture with measuring real and abstract parts of complex dielectric absorbency.

But at the time of measurement the process of exchanging mass in the line of “quiver wall – grain” and volume of grain mass cause to change the degree of connection between molecules of water and structure of grain mass. During this experiment, real and abstract parts of complex dielectric absorbency cannot be constant [2; 4].

In this research electro-physical sample of one kind of grain is moistened in different quantity, then primary measuring changer of wetness measuring device, which has condensator, is experimented in different conditions with the help of sensitive elements. The results of the experiments confirmed that if the wetness of material is much,  $\varepsilon$  and  $tg$  change fast. As relative dielectric absorbency of an experimenting material was compared with primary results during 20 minutes, the absorbency increases till 10 %, losses increase till 25 %, for wet grains till 0.3 %, for dry grains till 1.5 %. So, changes of  $\varepsilon$  and  $tg$  in time can be used as the parameter of extra information in defining moisture of grains.

The analyses of the results investigating relative dielectric absorbency of an experimenting wet grain and losses, which depends on time, and the results that are taken with the help of sensitive condensator element, which is made of different materials, show that after placing experimenting sample of grain into a quiver the process of exchanging wetness is happened in the line of quiver wall – grain

and in volume of grain mass; changes are happened in both the direction of losses and the direction of connections. These processes cause to change  $\varepsilon$  and  $tg$  during all experiment. The process that happens in the volume of latter experimenting sample, which occurs after placing experimenting sample of grain into a primary changer-quiver-condensator, can be explained like that. At the moment of placing grain into a quiver all features are changed and the torn of energy happens. As a result, water molecules are linked much stronger and we can see the decrease of  $\varepsilon$  and  $tg$ . After placing the sample, new quiet state appears

and ties between water molecules and grain structure diminish. This causes the increase of  $\varepsilon$  and  $tg$ . After some time the process of stopping connection of independent and dependent moisture in grain occurs and ties of water molecules balance [3; 4].

The processes that are given above have complex character, which depends on the material of walls of sensitive element; it influences considerably on the exactness of dielcometric devices that measures moisture. The speed of exchanging wetness depends on the degree of moistening an experimenting sample of grain.

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## Substantiation of parametres division drum with an elastic element spinning the device

**Abstract:** In article it is resulted a design and a work principle division drum with the elastic plug of spinning installation. On the basis of the numerical decision of a problem dependences of change of parameters drum are received, their best values are proved.

**Keywords:** Division drum, a tooth, a fiber, a tape, diameter, rigidity, a friction, coupling.

The choice of optimum or best parameters and operating modes division drum basically depends on technology of digitization of fibred of a clap. The question of influence of fibres with teeth's division drum is well shined in works [1; 2]. In the given works process of rupture of fibres from a tape submitted to a digitization zone is insufficiently studied. Besides the problem becomes complicated that teeth's division drum are established on a screw line.

In a zone of combing of fibres teeth's division drum operate on fibres which is in attainability limits, and from a tape those fibres which communication with a tape is less than total force of influence of a tooth with a fibre are taken. At tooth influence division a drum from a small beard one or several fibres are taken. Follow to notice, that one fibre can be grasped two or several alternating teeth's барабанчика. Fibre separation comes under the influence of forward or lateral sides of teeth's. The arrangement of a separate fibre on set depends on its arrangement in a small beard. Fibres located under a corner to a direction of movement sets, or tightened can a life extended by a forward side of a tooth. Usually in existing designs

division drum fibres located under a corner to a movement vector tend to formation of small knots. And in an offered design division a drum the fibres located under a corner to a direction of movement also are separated at the expense of increase in the axial force, operating from teeths [3], and also additional angular fluctuations drum because of deformation of the elastic plug.

Division drum it is executed compound (see fig.1) including an axis 1, on it metal 2 and further rubber plugs 3, and also the external plug 4 with gear гарнитурой 5. In the course of work at the expense of deformation of the elastic rubber plug 3 in a circular direction to occur original torsional fluctuations of the external plug 4 with gear headset 5.

The amplitude and frequency of these fluctuations basically depends from inertсионно-zhestkostnyh system characteristics. Thus definition of parameters division drum, providing effective division of fibres from a submitted tape in the spinning car is important. In the course of digitization drawing out fibres from a small beard occurs under certain conditions.

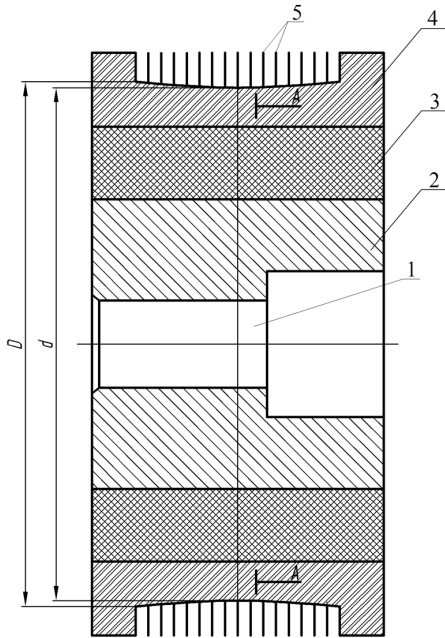


Fig. 1 Scheme compound division drum

From a condition equilibrium fibres on a forward side of a tooth division drum the formula for definition of diameter drum [4] has been received:

$$D \leq \frac{2[mg(\cos\phi + f \cos\gamma) - F_{sts} \cdot \cos\theta]}{m(\omega + \frac{30N}{\pi n c \Delta t})^2 \cos\alpha}, \quad (1)$$

where:  $m$  — weight of fibres;  $f$  — factor of a friction of fibres about a tooth surface барабанчика;  $F_{sts}$  — force of coupling of fibres with a tape great bulk;  $\omega$  — angular speed drum;  $g$  — acceleration of free falling;  $N$  — capacity on a shaft drum;  $n$  — number of turns division drum in minute;  $\Delta t$  — time for moving (plug deformation)  $\Delta\phi$ ;  $\gamma, \theta, \alpha$  — about the answer corners defining position of fibres on a forward side of a tooth division drum. Thus:

$$\begin{aligned} m &= 3.0 \cdot 10^{-6} \text{ kg}; F_{sts} = 0.08 \text{ gr}; g = 9.81 \text{ m/s}; \\ \omega &= 628 \text{ rad/s}; f = 0.32; \gamma = 15^\circ; \theta = 85^\circ; \alpha = 75^\circ; \\ \phi &= 20^\circ; C = 9.2 \cdot 10^{-2} \text{ nm/rad}; N = 14.3 \cdot 10^{-3} \text{ Kvt}. \end{aligned}$$

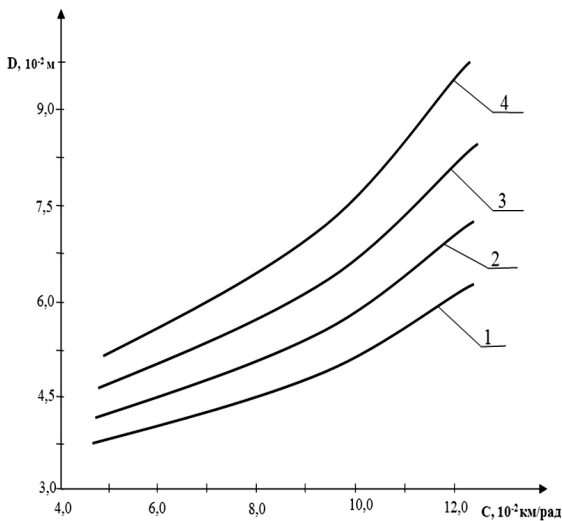


Fig. 2. Graphic laws of change of diameter division drum from circular rigidity of the elastic plug,

where:

$$\begin{aligned} 1 - m &= 6.5 \cdot 10^{-6} \text{ kg}; 2 - m = 5.5 \cdot 10^{-6} \text{ kg}; \\ 3 - m &= 4.5 \cdot 10^{-6} \text{ kg}; 4 - m = 3.5 \cdot 10^{-6} \text{ kg} \end{aligned}$$

It is necessary to notice, that increase in diameter division drum a drive to increase of linear speed of a fibrous material. But, inertial indicators division drum thus increase, that can lead to the undesirable phenomena at digitization.

On the basis of research graphic dependences of change of diameter division drum from a variation of values of circular rigidity of the elastic plug division drum are received. The analysis of the received schedules shows (fig. 2) see, that with increase in circular rigidity of the elastic plug from  $5.4 \cdot 10^{-2} \text{ nm/rad}$  to  $11.7 \cdot 10^{-2} \text{ nm/rad}$  diameter division drum increases on nonlinear law. So, at weight of a bunch of the fibres grasped by teeth's drum  $6.5 \cdot 10^{-6} \text{ kg}$ . diameter increases from  $3.76 \cdot 10^{-2} \text{ m}$ . to  $6.10 \cdot 10^{-2} \text{ m}$ , and at weight of fibres  $3.5 \cdot 10^{-6} \text{ kg}$ . diameter increases to  $9.4 \cdot 10^{-2} \text{ m}$ . speaks that with increases in weight of fibres force of a friction between fibres and a tooth increases that will be possible easily their separation I will overcome force of coupling of fibres with sheathe in weight of a tape. With the account of results of researches in work [5], the author recommends values of diameter and to accept in limits  $(6.7 \dots 7.1) \cdot 10^{-2} \text{ m}$ . which are considered as the best. Therefore for simplification these limits of values of diameter drum at high efficiency recommended values the circular.

Rigidity of the elastic plug is  $(9.4 \dots 10.2) \cdot 10^{-2} \text{ nm/rad}$ . It is necessary to notice, that thus also it is provided necessary circular fluctuations gear sets division drum. The amplitude of fluctuations of angular speed reaches to  $(2.5 \dots 5.0) \%$  from average value of angular speed.

On fig. 3 graphic dependences of change of diameter division drum from change of force of coupling of fibres grasped by teeth drum with a tape lump are presented. It is known [2], that the more density of a fibrous tape, the more force of coupling between fibres. From the received schedules it is visible, that with increase of force of coupling  $F_{sts}$  values of diameter drum on nonlinear law considerably decrease. So, at increase  $F_{sts}$  от  $0.76 \cdot 10^{-1} \text{ gr}$ . до  $2.1 \cdot 10^{-1} \text{ gr}$ . division drum decreases from  $9.0 \cdot 10^{-2} \text{ m}$ . до  $6.39 \cdot 10^{-2} \text{ m}$ . circular rigidity of plug  $6.0 \cdot 10^{-2} \text{ nm/rad}$ . At circular rigidity  $12.0 \cdot 10^{-2} \text{ nm/rad}$  this reduction occurs in limits from  $7.43 \cdot 10^{-2} \text{ m}$ . до  $3.62 \cdot 10^{-2} \text{ m}$ . For maintenance of recommended values of diameter division drum  $(6.7 \dots 7.1) \cdot 10^{-2} \text{ m}$ . and at  $(9.4 \dots 10.2) \cdot 10^{-2} \text{ nm/rad}$  figurative values  $F_{sts} = (1.31 \dots 1.54) \cdot 10^{-1} \text{ gr}$ . and values of density of a fibrous tape corresponding to them are considered.

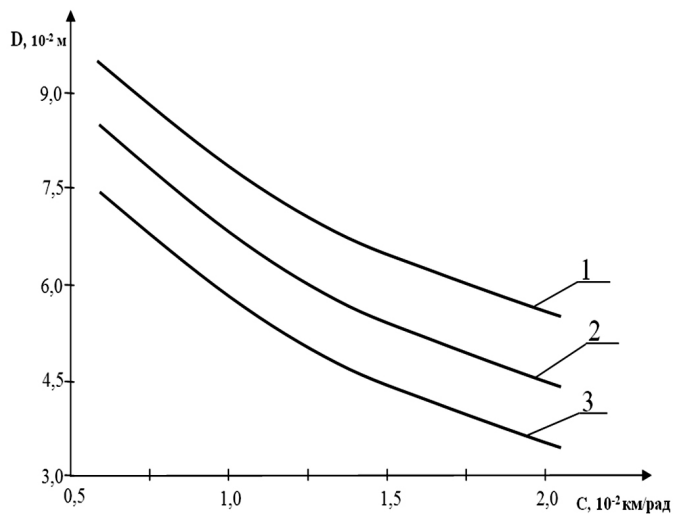


Fig. 3. Dependences of change of diameter division drum from a variation of force of coupling of fibres with a great bulk

where:

$$\begin{aligned} 1 - C &= 12 \cdot 10^{-2} \text{ nm/rad}; \\ 2 - C &= 9.0 \cdot 10^{-2} \text{ nm/rad}; 3 - C = 6.0 \cdot 10^{-2} \text{ nm/rad} \end{aligned}$$

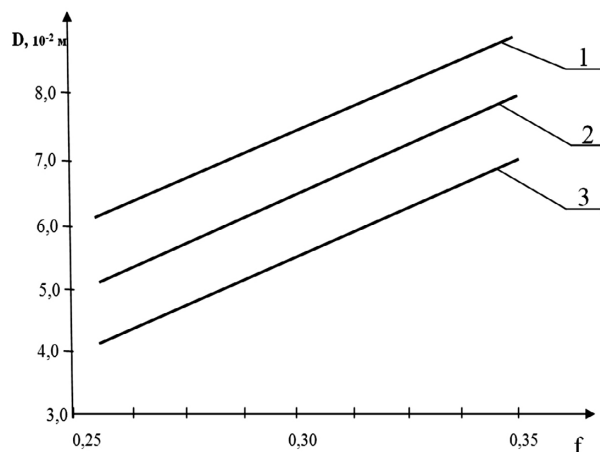


Fig. 4. Dependences of change of diameter division drum from a variation of factor of a friction of fibres about a tooth drum, where: 1 –  $w = 750 \text{ s}^{-1}$ ; 2 –  $w = 650 \text{ s}^{-1}$ ; 3 –  $w = 550 \text{ s}^{-1}$

On fig. 4 laws increases division drum from a variation of factor of a friction between fibres and before are presented diameter a side of teeth's drum which have linear laws.

The factor of a friction of fibres about a tooth surface division drum depends basically on properties of a fibre, its humidity, contact, weight of fibres on a surface of a forward side of a tooth and angular speed taking into account values of its fluctuations.

With the account of the above-stated the factor of a friction of fibres about a forward surface of a tooth division drum changes in limits 0.25 ... 0.35. Increase of force of a friction of fibres about a forward surface of a tooth барабанчика positively influences process of capture and extraction of fibres of a submitted tape process of digitization of fibres is intensified. From schedules it is visible, that with increase in

factor of a friction from 0.27 to 0.33 diameter drum increases from  $6.48 \cdot 10^{-2} \text{ m}$ . to  $8.26 \cdot 10^{-2} \text{ m}$ . at  $\omega = 750 \text{ s}^{-1}$ , and at  $\omega = 550 \text{ s}^{-1}$ , diameter drum increases from  $4.41 \cdot 10^{-2} \text{ m}$ . to  $6.24 \cdot 10^{-2} \text{ m}$ . This results from the fact that, the more weight of fibres angular speed and size of its fluctuations, the is more than pressure of a fibre upon a forward surface of a tooth of a drum and the more force of a friction. For maintenance of the demanded diameter division drum in repartitions  $(6.5 \dots 7.5) \cdot 10^{-2} \text{ m}$ . for maintenance of linear speed of movement of fibres in repartitions  $9.27 \dots 4.5 \text{ km/s}$  the friction factor should be 0.26 ... 0.32.

#### Conclusion

Use new division drum with an elastic element and recommended parametres improves process of spinning and quality of a received yarn.

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## The results of testing of perforating metal trusses units to many times repeated loading

**Abstract:** The article presents the results of the test pieces of flat knots perforating metal truss railway bridges with differenced connected elements. As a result, the dependences for determining the carrying capacity of elements perforating farms and their residual life, taking into account available manufacturing defects.

**Keywords:** truss, components, test pieces, shear deformation, re-loading.

Many years of experience in the construction and operation of metal bridges with perforating farms shows that in the process of manufacture, transportation and installation of superstructures may occur deviations from the project — discrepancy between

the geometric dimensions of the elements, unacceptable gaps (differences) in the connecting member, what raises the need for on impact assessment studies of deviations to the operational reliability of superstructures.

In [1; 2] shows the results of testing of experimental nodes fragments perforating metal truss railway bridges under static loading, and set the quantitative effect of the initial defects of manufacturing and installation work on node connections. The study of such joints of trusses is of great practical value under many times repeated loading.

Flat fragments with differences connected elements up to 4.5 mm. in the laboratory of the company “NIPPONSTEEL” were tested. Totally was manufactured 6 samples with differences of connected elements — 0, 3 and 4 mm.

Tests were carried out by employees of the company Saubaku Nippon Steel Engineering Co. Ltd and Joint-stock “O’zog’irsanoatloyiha”.

The author participated in the processing of the experimental results and the preparation of opinions.

Measurements of shear strain during loading were recorded without stopping the pulsating load Electrical load cells. The detailed methodology of measurement of deformations is given in [1].

Options of repeatedly re-loading fragments were chosen by close to the actual operating conditions. The maximum value of the stress of tensile stress  $\sigma_{max}$  were assumed about at 0.8...0.9 of the voltage corresponding to the beginning of an overall shift, and the minimum value was equal to  $\sigma_{min}$  within 0.3...0.4 of this voltage. The frequency of the application cycle — 800 repeated loadings per minute. The minimum number of loading cycles —  $2 \cdot 10^6$  cycles.

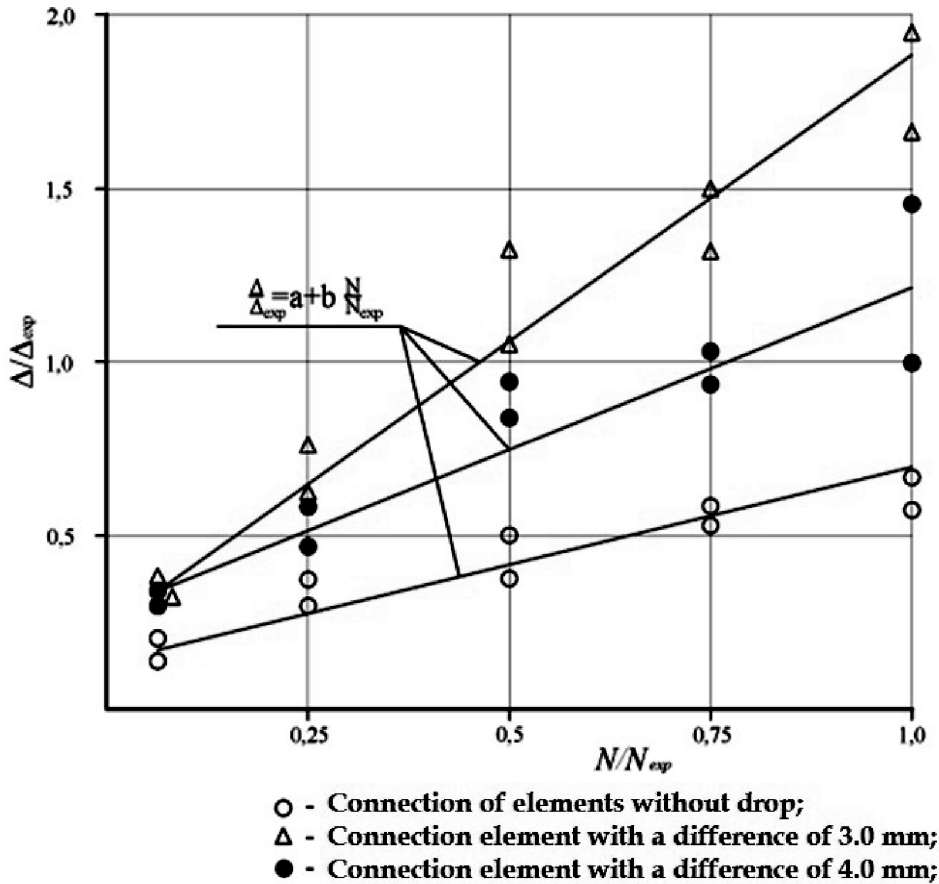


Fig. 1. The dependence of the shear deformations increase with repeated loading

On the fig. 1 were listed results of tests of experimental pieces.

As can be seen from the Figure the increase in the differential growth of connected elements increases the shear deformations. The fragments without fluctuations in the compounds after  $N_{exp} = 2 \cdot 10^6$  load cycles accumulation of shear deformation was about 0.6 times from the level of the beginning of a general shift, ie connection works in the elastic region. When differential elements are 4.0 mm of accumulation of strain out of the elastic region and moved into the plastic zone.

Over the limit shift  $\Delta$  accepted starting point of a general shift  $\Delta_{cr}$ , established based on the results of static tests [3; 4].

These changes depending on shear deformations under repeated loading multiple-fitted by the least squares method:

$$\Delta = \Delta_{cr} \left( a + b \frac{N}{N_{exp}} \right), \quad (1)$$

where,  $a = 0.2$ ;  $b = 0.4 + \delta/3.5$ ;

$\delta$  — the magnitude of fluctuations in the connected elements, mm.

Proposed dependence satisfactorily describes the experimental results, the correlation coefficient calculated in the usual manner (the mathematical statistics) is in the range  $\rho = 0.72$ . The reliability coefficient of correlation to check the condition of the normal distribution of the random variables:

$$\Delta = \Delta_{cr} \left( a + b \frac{N}{N_{exp}} \right); \quad (1)$$

$$\frac{|\rho|}{\sigma_p} = \frac{0.72}{0.196} = 3.67.$$

When the probability of  $P = 0.95$  value  $t = 1.96$  [5], as  $\frac{|\rho|}{\sigma_p} = 3.67 > t_p = 1.96$ , the resulting dependence is significant.

The resulting dependence of growth shifts of connected elements in the joints nodes through metal trusses in the process many times — reloading can be used in the future to assess the carrying capacity of elements of farms and their residual life, taking into account these changes.



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## Installation of the IR dryer of raw cotton

**Abstract:** The research offers the method of drying of raw cotton with pulsed IR radiation. Pulsed IR radiation is produced by functional ceramics of special preparation. Developed installation differentiates with energy savings and doesn't demand expenditure of hydrocarbon fuels.

**Keywords:** raw cotton, IR dryer, functional ceramics, radiant.

The process of drying wet materials is not only thermal, but also the process. Technical and energy parameters of the existing technologies of drying of agricultural products remains at the level of the 70s and the achievements to date using energy-intensive and expensive equipment.

In the present report indicated prospects of IR pulses in systems for drying agricultural products distinguished by their high operational parameters, low production costs and material consumption.

In recent years, it managed to develop a technology for functional ceramics, transforming primary energy pulsed infrared (IR) radiation and their widespread use in various fields of national economy [1, 472].

All materials were dried divided into three types: a capillary porous body, the body and colloidal colloidal capillary porous body. It is considered that the best effect in the drying process can be achieved in cases where the maximum light minimally absorbed by water and the base material. If we speak of thin layers of the objects, all substantially reduced to ensure that they do not overheat and retain their basic properties, it is also desirable to reduce power consumption and time [2, 69–73]. Not least take ease of use and reliability of the devices. In thin layers of poorly problem manifests solvent diffusion from the interior of the product to be dried. When it comes to thick layers, this problem comes in the first place, since she is the slowest step of the drying process and the total rate will be determined by it. The vacuum drying, vacuum it helps to speed up this step. But they are complex structures and high costs, as well as the practical difficulties of operating such systems.

The easiest solution to the problem — is to use pulses of high density at a low average power. Assume that the depth of penetration of the power P IR is for example 2 mm. If we will provide a pulse of radiation density 100 times greater, in order to obtain the same energy density within the product at the same extinction coefficient (specific penetration particular wavelength of radiation per unit thickness), the radiation penetration depth will increase approximately by the same factor. To ensure that the product is not spoiled due to overheating, we need approximately 100 pulse durations not give any energy. Characteristically, it is now possible to significantly increase the average power as the energy is distributed not only on the target surface of the product, but also by volume. Furthermore, since the diffusion of solvent from the inner layer greatly increased, it is unnecessary to capture energy and the product cools. When observed under pulsed, to select

the optimal wavelength infrared radiation and correctly calculate the gas dynamics, the product can be heated when it is actually heated, below the ambient temperature. In light of the foregoing ceramics was developed, transforming the primary continuous radiation source in pulsed infrared radiation [3, 74–77; 4, 69–73].

Why Choose infrared is clear — this is an area of water absorption. At first glance it seems that the more the power of the pulses, the better and more efficient will be the drying process. In reality it is not so. The reason is that if the pulses are too powerful, they are too far and most of the energy is lost, is not absorbed by the product. If you go back to the version that we saw when the pulse power exceeds the average 100 times the penetration depth for the same given level of illumination to be about 500 mm. The thickness of the product is only 100–200 mm. At the same time a large part of the energy Un-absorbed lost. Theoretically, this thickness should be increased in the pulse power  $(30-60)^2 = (15-30)$  time [5, 1].

For drying the raw cotton used as emitters quartz tube 10 mm in diameter on the surface of which ceramic coated with pulverized grain size of 40–60 microns, which was placed Nichrome spiral. The thickness of the ceramic layer was about 20–40 microns. Studies ceramic radiation spectrum caused by the filament by radiation, showed that the spectrum contains pulses ceramic IR wavelength ~ 16 microns and a duration of about 10 microseconds. Radiators 1000 mm. long attached to the individual blocks are connected in series pairs and connects the power supply 220 (Fig. 1).

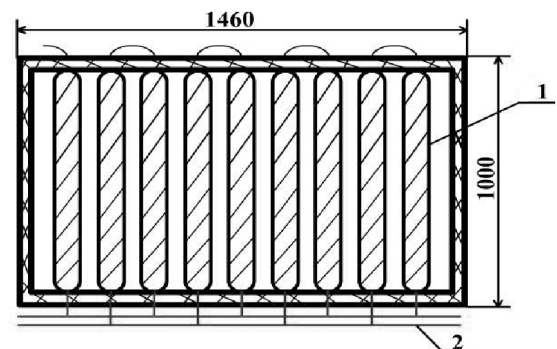


Fig. 1. Transmitter unit: 1 – Ø10 emitters of quartz tube; 2 – connection voltage

In order to use the installation in the factory, we have developed plant for drying cotton column type (Fig. 2).

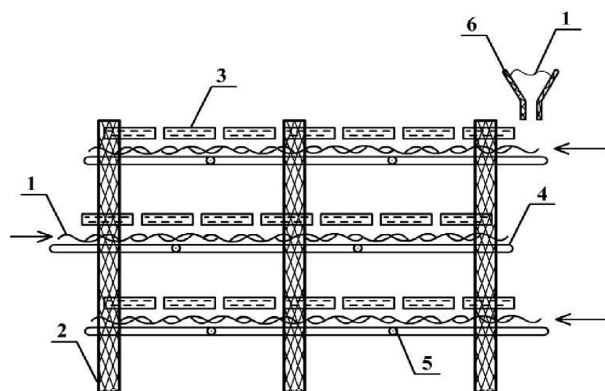


Fig. 2. Show Desktop drying device raw cotton

On Fig. 2: 1 – raw cotton; 2 – rack; 3 – block radiators; 4 – conveyor belt; 5 – clips; 6 – hopper for feeding of raw cotton (the arrows indicate the direction of movement of the conveyor belt).

Total installation — 7500 mm. length, width — 1500 mm., height — 2200 mm. The speed of the rotating movement of the conveyor belt 0.25 m/s. With such a belt speed, in the drying installation with 7.5 tons of seed cotton per hour allows wherein reduce humidity of 2–3 %.

Currently, the ginneries mostly installed two gin (voloknootdelitelnye machine) brand of DP-130 or DPC-180, the performance of which, depending on the varieties of raw cotton is 12–14 m/hour.

If necessary, depending on the level of raw cotton moisture can change the intensity of the infrared radiation, the length/width or speed of the conveyor belt.

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## Use of unplasticized polyvinyl chloride (uPVC) casing pipes in water supply well construction

**Abstract:** The article contains the information about the practical experience of the use of unplasticized polyvinyl chloride (uPVC) casing pipes in water supply well construction as exemplified by the work of LLC «AkvaStroyMontazh», one of the pioneers of this technology in the northwest of the Russian Federation. The development of the technology is described in detail: the reason of its appearance, difficulties faced in the process of its implementation, obtained economic effect and a broad range of non-economic advantages.

**Keywords:** Water supply well, uPVC pipes, well construction, well installation, well deviation, drilling mud.

*The article presents Russian experience of the use of unplasticized polyvinyl chloride (uPVC) casing pipes in water supply well construction. The use of plastic pipes allows accelerating the performance of works, reducing their production cost and human factor effect. A technology of well drilling in the shifting soil was developed for the purpose of successful application of uPVC pipes in the drilling works on the territory of the Leningrad region.*

The importance of the underground waters in the supply of drinking water to the population both in Russia and the world in the whole is steadily growing [3, 22–28]. This is mainly promoted by the following factors:

- pollution of the surface water sources;
- development of the so-called suburban construction and the increased significance of autonomous water supply related to it, the optimal way of installation of which is the use of underground waters;
- improvement of drilling technology.

Over 300 million water supply wells have been drilled in the world in the last 25–30 years. For instance, about a million water

supply wells, the water of which is used not only for domestic needs, but also for irrigation and technical water supply, are drilled annually in the USA [5, 1–2]. In this respect, innovative technologies for water supply well construction with the use of progressive technologies and materials are becoming increasingly important.

In Russia, well drilling, as a technological direction, generally has a powerful scientific support, which, in fact, is not homogeneous for different segments of the industry. If the researches of drilling and, broadly, construction of wells intended for exploration and extraction of raw hydrocarbon deposits engage numerous highly qualified scientific personnel, whose work results in a significant volume of innovative technical experience, the scientific support of water supply well drilling is insufficient. But, that does not mean that this direction doesn't develop — there are new technical solutions and, from time to time, real technological breakthroughs. However, their driving power most often lies in the efforts of skilled production workers who implement progressive technologies at their own risk.

The above stated fully relates to the innovative technology of hard uPVC casing pipe application for water supply wells.

### UPVC casing pipes: introduction

In 2010, all drilling companies in the Leningrad region used steel pipes in the installation of wells for underground waters extraction. While uPVC casing pipes had been successfully used abroad for several decades, in our country, information about the technology using uPVC pipes was in the form of fragmentary non-systematized data. The author of the article, a certified engineer-hydrologist, became interested in the new technology.

Already at the first stage of familiarization with uPVC casing pipes, it became obvious that the application of these pipes in lieu of the traditional steel pipes was a promising direction. Gradually, a whole complex of tasks that could be solved by such an effective tool as uPVC pipes came up.

Firstly, the comparison of plastic and steel pipe prices suggested that the replacement of steel pipes with the plastic ones would lead a significant reduction of capital costs on well construction.

Secondly, the use of plastic pipes promised to significantly enhance the pace of works on well installation, increase the productivity of the company's work in the whole and reduce the time of performance of certain orders.

Thirdly, the application of uPVC pipes leads to the improvement of production culture, reduction of hard manual labor, because plastic is much lighter than steel. Reduction of the material weight notably facilitates the logistics: there is an opportunity to withdraw from heavy multi-ton vehicles because the delivery of plastic pipes to the site can be performed even by a low-capacity pickup truck. Plastic pipes are easier to store; moreover, the speed of their delivery increases and the cost reduces meaning that the overhead costs decrease.

Fourthly, the use of plastic pipes allows reducing the human factor effect on drilling works as the low quality of pipe thread often leads to the parting of the drilling string.

Altogether, the benefits from the use of plastic casing pipes allow substantively, by dozens of percent, reducing the production cost of a well. This is a sure way to increase of marginality (profitability) of business and gain competitive edge.

The increase of economic efficiency of water supply well construction is possible due to the optimal effect of all resources included in the production process, the most important of which are the following:

- staff — qualification level as well as adherence to production and technological discipline;
- materials;
- equipment;
- other means of labor.

All of them, and, most importantly, their quality, impact the end results of a drilling company operation. Expenses on materials are the most important expenditure category during well construction and a special place among them is given to casing pipes.

While choosing casing pipes today, there are, as a rule, two alternatives — steel pipes and pipes made of polymers, predominantly uPVC, and more rarely — made of polyethylene and polypropylene. Economic benefits (economic effect in monetary terms) is the main factor determining the choice.

The economic advantage from the implementation of uPVC casing pipes can be determined using a general formula of economic efficiency calculation:

$$E_m = \left( \frac{N_m \times P_m}{C_m} - \frac{N_{imp} \times P_{imp}}{C_{imp}} \right) \times Q,$$

where:  $E_m$  — economy of current production cost;

$N_m$  and  $N_{imp}$  — norms of material consumption, respectively, before and after the implementation of the event (in this case, before the replacement of steel pipes with uPVC pipes);

$P_m$  and  $P_{imp}$  — price for a unit of the material, fuel etc. before and after the implementation of the event;

$C_m$  and  $C_{imp}$  — coefficient of use of material resources before and after the implementation of the event;

$Q$  — cumulative production.

Apart from the economic impact, a scientific-technical impact should also be taken into account: functionality, environmental safety and simplicity of use of uPVC pipes. The latter, for instance, is expressed in the reduction of loads on the staff at the expense of exclusion of inevitable use of demanding, mainly manual, labor in the case of steel casing pipes.

Significantly lower mass of polymer pipes compared with the other does not only facilitate the labor of the staff, but also has a direct economic impact. It is determined by the reduction of transportation costs that are an integral part of the production costs of well construction (see Table 3).

### Comparison of the mass of steel and uPVC casing pipes

Comparison of the mass of uPVC and steel casing pipes clearly certifies about the benefit of the former. To realize this, one can use two normative-technical documents: «GOST 632–80. Casing pipes and their collars. Technical conditions (with Amendments № 1, 2, 3, 4)» and «TU 001–84300500–2009. Pipes and filter cases for wells made of unplasticized polyvinyl chloride with thread». GOST 632–80 was put into effect on January 1, 1983; in the part of pipe execution A, on January 1, 1984; its validity was extended till January 1, 1993 by the Decree № 174 of the State Standard of the USSR as of 24.01.1986. From July 1, 2003 till the technical guidelines came into effect, it and the majority of acts of federal executive bodies in the sphere of technical regulation are of recommended nature and subject to compulsory execution only in the part corresponding to the purposes specified in item 1, article 46 of the Federal law № 184-Φ3 as of 27.12.2002.

TU 001–84300500–2009 developed by CJSC «Khemkor» came into effect on 25.06.2009 with unlimited validity.

If one selects steel pipes with external diameter of 127 mm. and uPVC pipes with a similar indicator equal to 125 mm. out of the standard series as most often used in water supply well construction, the mass of 1 linear meter of steel pipe will account for 19.1 kg. with the wall thickness of 6,4 mm, in accordance with GOST 632–80 [2, 10]; whereas one meter of uPVC pipe with the wall thickness of 6.0 mm. weighs 3.37 kg. (TU 001–84300500–2009). The correlation of the mass of a length unit of the compared pipes is almost 1:6, which means an absolute difference in the mass of a casing pipe at the length of 1 m equal to 15.83 kg.; at the depth of a well of 100 m. equal to 1583 kg., and at the depth of a well of 300 m. equal to 4749 kg.

### Reference information

Table 1. – Geometric sizes and mass of steel casing pipes (GOST 632–80. Casing pipes and their collars. Technical conditions (with Amendments № 1, 2, 3, 4)) [2, 10]

External diameter, mm	Wall thickness, mm	Internal diameter, mm	Mass 1 m, kg
127	5.6	115.8	16.7
127	6.4	114.2	19.1
127	7.5	112.0	22.1
127	9.2	108.6	26.7
127	10.2	106.6	30.7

Table 2. – Geometric sizes and mass of uPVC casing pipes (in accordance with TU 001–84300500–2009. Pipes and filter cases for wells made of unplasticized polyvinyl chloride with thread) [9, 5]

External diameter, mm	Wall thickness, mm	Mass of uPVC pipes, kg			
		L = 1000 mm	L = 2000 mm	L = 3000 mm	L = 4000 mm
125	5.0 + 0.9	3.0	5.8	8.6	11.4
125	6.0 + 0.9	3.37	6.73	10.10	13.46
125	7.5 + 1.0	4.3	8.5	12.6	16.7

### Comparison of the cost of steel and uPVC pipes

The definition of production cost of works on water supply well construction can be done by analytical way on the basis of a calculation with the use of normative and project documents included in the budget normative base of price formation in construction and on the basis of work experience of certain enterprises. As it is known, by the Decree of the Ministry of Construction of Russia № 31/np as of January 30, 2014 «About putting new state costing standards into operation» (in the revision of the order № 39/np as of February 7, 2014), a new edition of the state costing standards was put into operation on April 1, 2014 and added to the federal register; it included: state itemized costing standards (GESN-2001), federal unit rates (FER-2001), collections of estimate prices on materials (FSSTS-2001).

Table 3. – Estimated distribution of costs in water supply well drilling

№	Cost item	Relative share of cost, %
1.	Primary and secondary materials	
	– including casing pipes	20–24
	– chemical reagents	0.5–1.5
2.	Expenses on drilling equipment	6–8
3.	Transportation costs, including shift team transportation	10–12
4.	Expenses on fuel, electric and heat energy	4.0–6.0
5.	Depreciation of equipment, repair of equipment and tools, spare parts	10–12
6.	Salary and social insurance	10–12
7.	Environmental safety	1.5–2.5
8.	Other	29–31

Statistical information about the average cost of steel pipes and uPVC pipes can be found in open resources, although, it is quite widely scattered. It is determined by the current market situation, presence of anti-corrosion protection in steel pipes, their affiliation with the steel grade group etc. But, comparing uPVC pipes and steel pipes, similar in the exploitation character, with the external diameter of 125 and 127 mm. respectively, one can estimate approximately the absolute rates of economy gained by the producer and customer using uPVC casing pipes. As the market review demonstrates, the cost of one meter of a steel casing pipe is from 800 to 1600 rubles; whereas, one meter of uPVC pipe is from 350 to 450 rubles. Thus, one can rightfully talk about the correlation of prices 1:2 in favor of uPVC pipes. In absolute figures, one can talk about the economy of approximately 40 000–100 000 rubles in case of the length of a casing string of 100 m. and 120 000 and 300 000 rubles in case of the well depth of 300 meters.

### First experience and first difficulties

There is a large distance between the «construction» of plans and their realization. Mastering of new technologies was required, but there was no-one to learn from. Drilling companies undertook single trial attempts to use uPVC pipes, but none of them succeeded in achieving a positive sustainable result. It became obvious that trial-and-error approach is not the best, but the only possible one in the given circumstances.

The use of polyethylene and polypropylene pipes (such pipes are still used today in small amounts) was the precursor of the use of uPVC pipes at «AKVASTROYMONTAZH», but it was

State costing standards. Earlier, the Provision about the structure of cost on production and realization of a product (works, services) and order of formation of financial results taken into account in taxation of profits approved by the Government of the Russian Federation № 1095 as of September 11, 1998 with further supplements and amendments was the main document in formation of the production cost of a product at the enterprise. To calculate the production cost of water supply well construction, one can use the Federal estimate prices on exploitation of building machines and collections of tariffs on cargo transportation.

Based on these documents and work experience in the market of drilling companies, one can group relative share of costs in % on water supply well construction in the form of a table 3.

apparent immediately that they were only suitable for the installation of small wells with the depth up to 30 meters.

The first experience of work with plastic pipes showed that they demand much more from the geometry of a well bore compared to the other. And, if a steel pipe is ready to «excuse» unevenness and fluctuations of the diameter gauge, the plastic one won't. The first difficulties were related to this peculiarity of pipes. Roller cone bits with the diameter of 151 mm. were used to drill wells (bore or hole) for uPVC pipe and steel pipes. Starting from the depth of 30 m., the uPVC pipe didn't «want» to go down further, while its diameter was 125 mm. (plus local thickening of 134 mm.) and the diameter of the steel pipe was slightly bigger — 127 millimeters. But, the steel pipe was going down under its own weight cutting off the unevenness. If required, it was possible to put pressure on, hammer and push the steel pipe. The use of such method with a priori «gentle» plastic pipes requiring delicate treatment is categorically unacceptable.

It developed that the well bore drilled with a roller cone bit is not as even as it seemed initially. Moreover, the diameter of the bore is not same along its length. At the expense of different inclusions, more solid than the surrounding rock or, on the contrary, soft and loose, it may narrow. The soil disturbed by drilling equipment starts moving and heaving; separate fragments fall out. Especially difficult problem was posed by the fragments of float stones, pebbles and gravel. Small stones moving in the soil caused the change of configuration of walls of the well bore and became an insurmountable obstacle for a plastic pipe. The depths up to 100 m. turned out

to be especially difficult in this respect. There could be 5–6 or even more places at every site that became an insurmountable obstacle on the pipe's way down.

It was possible to address the experience of foreign colleagues who used uPVC casing pipes. But, it emerged that even in the USA, where a vast experience of installations of wells with uPVC pipes in solid (rock or similar in properties) materials was accumulated, the method of construction of wells in moving, poorly «keeping the shape» of the bore materials was not developed.

The simplest and obvious solution was to do ample drilling, i. e. with a roller cone bit with the diameter of 161 mm. instead of 151 mm. There was an alternative option to install a casing pipe of smaller external diameter in the well bore retaining the previous diameter of drilling equipment, but it was rejected because there could be problems with pump placement.

It should be noted that a transition from a common diameter of the roller cone bit of 151 mm. to uncommon diameter of 161 mm. is accompanied by the appearance of problems with the addition of cutting device to the complete set of drilling equipment as well as the need to use uncommon spare parts.

At the increase of the diameter of the well, it was required to use costlier drilling equipment; the consumption of drilling mud and fuel was augmenting; the difficulty of works was growing, but the speed of drilling was reducing as well as productive capability.

The transition to well drilling with the diameter of 161 mm. did not solve the problems — the plastic pipe was still reluctant to go down the hole of bigger diameter. Of course, one could continue moving in this direction, switching to the use of roller cone bits with the diameter of, for instance, 190.5 mm, but it is not known, if it would help to solve the set tasks. However, it was obvious that it would lead to the increase of expenses bringing to naught the advantages of replacement of steel pipes with plastic ones.

#### Search for optimal drilling mud composition

It became clear that the solution of the problem of poor possibility of the hole (bore) for the plastic pipe lies not in the increase of the diameter of the well but in the strengthening of its walls. The only way to achieve it is to use a drilling mud with a required set of properties.

It is known that the creation of backward pressure on the walls of the well and prevention of caving formation are one of its most important functions.

The main question is what drilling mud to use? «AKVASTROY-MONTAZH», like many other companies, used the mud of regular Cambrian Viennese clay. Mudding of the well walls with the wash-down with clay mud during drilling in the unstable rocks is a known way of strengthening the well walls. After the injection of clay mud in the openings of the rocks and its solidification around the well bore, the annular zone of the rock strengthens. But it didn't meet the entire complex of requirement in the drilling of wells for uPVC pipes.

It is known that to eliminate the problem of swelling and destruction of the well walls, polymers are added to drilling muds. For instance, partially hydrolyzed polyacrylamide (PHPA). Creating a polymer film on the surface of walls and isolating «opened» rocks, polymers make the hydration and/or disaggregation of clays slow down. However, the use of these polymers is limited because, in case of their big concentration, the muds become too viscous and lose workability [1, 99–108].

Silicates are also added to drilling muds intended to strengthen the walls.

It was decided to use the experience of horizontal directional drilling (HDD); similar problems were faced, but we learnt

how to solve them quite successfully. Moreover, a classic chart of drill penetration rate dependence ( $V_M$ ) on wash-down mud consumption ( $Q$ ) and optimal composition of different components in drilling muds depending on the rock properties were taken into account.

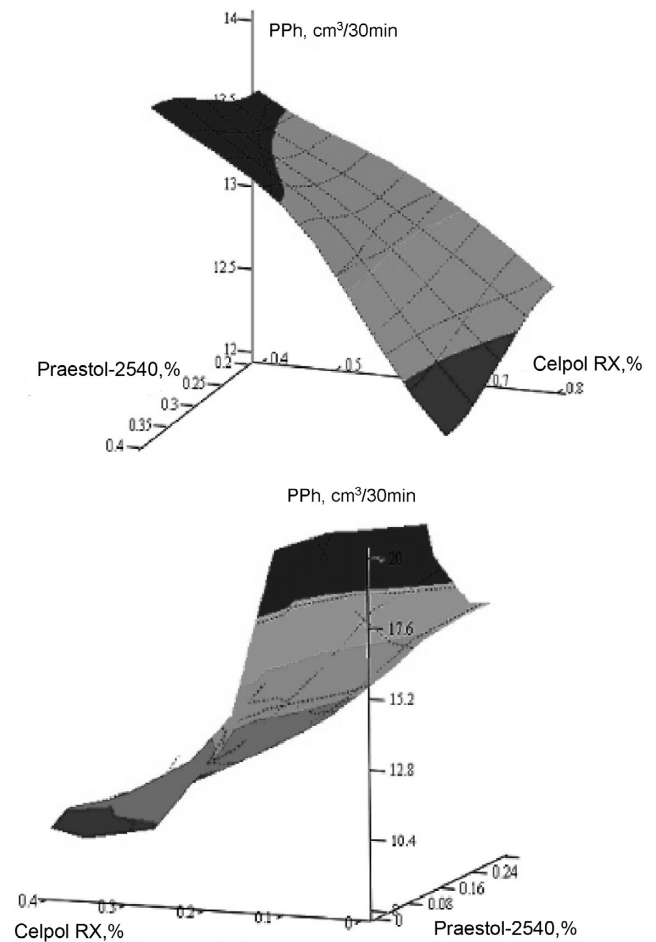


Fig. 1. Examples of impact of different concentrations of extender and soda ash mixtures on the indicator of mud filtration

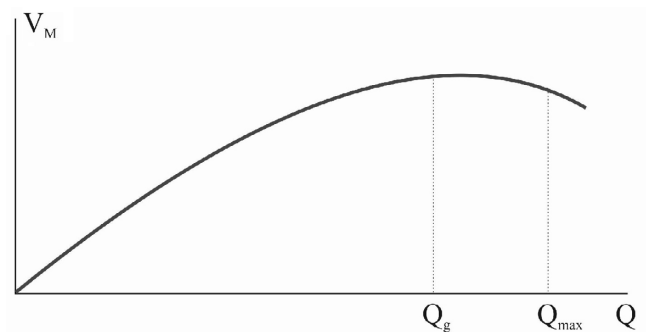


Fig. 2. Impact of drilling mud consumption  $Q$  on drill penetration rate  $V_M$

The chart (Fig. 2) shows that the increase of mud consumption is effective only until it reaches some value  $Q_g$ ; at  $Q_{max}$ , mechanical penetration rate stabilizes. The value  $Q_g$  depends on the structure of a bore bit, scheme of bottom-hole cleaning, specific axial stress, rotation frequency, rock hardness and drilling mud properties.

«AKVASTROY» considered the experience of drilling mud producers conducting independent research works and determining optimal compositions of drilling muds for drilling of various rocks based on their results (Fig. 3).

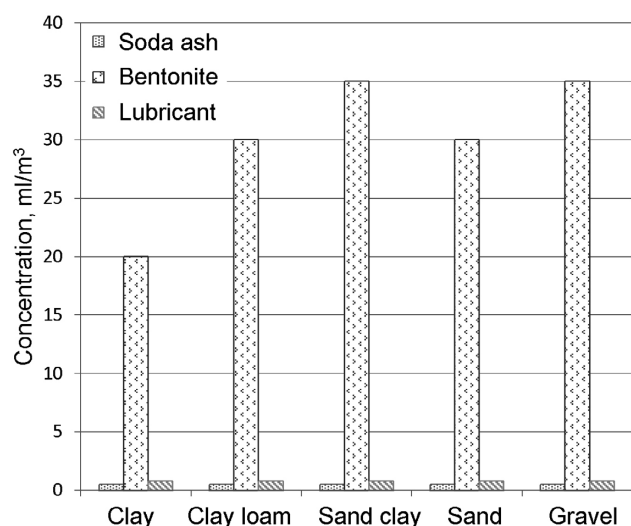


Fig. 3. Optimal content of separate components of drilling mud depending on the composition of rocks (according to the data of «Soyuzoptokhim»)

The analytical study of a big volume of special information resulted in making a decision to try bentonite clay that easily dissolves in water and expands by 7–8 times on contact with it.

Bentonite clay of the highest quality is extracted in Texas, USA. «AKVASTROYMONTAZH» acquired a few dozens of kilograms of mud produced based on its composition. Although, its cost was much higher than the common Cambrian clay, the positive effect turned out to be impressive. The well drilled the day before completely preserved its geometry even the next day, 10 and more hours after the removal of drilling string, which allowed easily inserting an uPVC pipe in it.

This result was not achieved immediately; the drilling mud based on bentonite clay was supplemented by special additions giving it unique properties. Structure-forming agents, modifiers of rheological parameters, reducers of filtration, stabilizers, lubricants, liquifires and biocides were used as additives.

Thus, high retaining and bearing capacity during drilling was ensured. And now, even at big depth of the well, its walls retained a stable form, which is so important for plastic pipes. The use of viscosifiers and fluid-loss reducers regulating the viscosity of the mud did not only reduce the consumption of bentonite, but also helped the formation of solid and flexible film on the walls of the well bore, which is the guarantee of competence even of such problematic soils as running ground and water-cut sand rock. Moreover, additions in the bentonite clay mud contributed to the improvement of cleaning of the well bore, prevention of sticking of small particles to drilling equipment, stimulation of removal of drilled rock, including the problematic small stones mentioned above.

#### Choice of drilling mode

Even during the drilling of wells with the application of quality drilling mud, there were situations when the inserted pipe started resisting upon reaching 60–80 meters. This, most probably, meant that starting from this point, the bore of the well was nonetheless deflected. This speculation confirmed the repeated drilling with the use of a basket bit because from this very place, a drill equipped with a basket bit started drilling from the actual beginning correcting the «geometry» of the bore that had gone aside.

Although, uPVC pipes possess high mechanical performance in respect of contraction and extension, natural, i. e. self-induced deflection of the bore from its design direction, can become a big problem in construction of water supply wells with the use of uPVC pipes. At

self-induced deflection of the bore, design bottom-hole pattern is violated; the running-in of casing pipes becomes difficult, especially at the sites of abrupt dog-legs. There are also adverse effects:

- extension of the bore;
- increase of consumption of power on drill string rotation;
- complication of control of load on the bore bit;
- increase of the cost of construction of the well compared to the cost of conditionally vertical one;
- at the deflected sites, inter-repair period (IRP) of pump equipment reduces significantly [4, 4–6].

Deflection of the well in the process of drilling, as a rule, is determined by one of the three groups of reasons: geological, technological and technical, influencing both, spatial well location and intensity of its deflection.

Geological factors influencing the deflection of the well include:

- anisotropy of rocks;
- texture and structure of rocks;
- structural-tectonic conditions of bedding of rock layers;
- alternation of rock layers of different hardness (in case of increase of frequency of alternation of rocks of different hardness, the intensity of deflection of the well increases) [8, 12–24].

Technical factors include the way of drilling, correctness of installation of a drilling machine, form of placement and exit of teeth and way of creation of axial load on the bottom hole.

Technological factors of well deflection include factors determined by the technology of drilling. Primarily, there are defined regime parameters: axial load on the bore bit, frequency of its rotation, consumption and quality of drilling mud as well as the way of drilling. The biggest difficulties in the struggle with well deflection come up at rotational way of drilling [8, 30–32].

Today, different regularities of impact of technical-technological factors on the deflection of drilling wells have been revealed.

The direct effect on it is created by:

- number of cone rollers and bit blades;
- construction of bore bit, bore bits of cone roller type deviate the well bore by bigger value than cutting bore bits.

Type and construction of the bore bit primarily influences not the direction but the intensity of deflection of the well bore.

A number of rotations of the bore bit and mechanical rate of drilling are more significant factors.

The impact of the frequency of the bore bit rotation determined by the possibility of buckling of the drilling string under the effect of centrifugal force is two-base. On the one hand, as the frequency of rotation increases, the values of deflection force affecting bore bit augments. On the other hand, the stability of the pipe enhances, i. e. its resistance to the change of axial direction leading to the reduction of deflection grows.

Deflection processes intensify with the increase of axial load, which is the main factor determining the intensity of rock destruction. With the growth of axial load on the bore bit, the degree of bending of the bore bit relative to the well axis increases. Moreover, increase of axial load on the bore bit enhances the development of well walls, which also leads to a more intensive deflection of the bore hole.

At least 2/3 of costs on drilling and well casing depend on the duration of the drilling, thus, it is not surprising that the growth of the drilling rate is considered as one of the most obvious ways of reduction of well production costs. The dependence of the drilling rate on the axial load on the bore bit is not same for different rocks (Fig. 4).

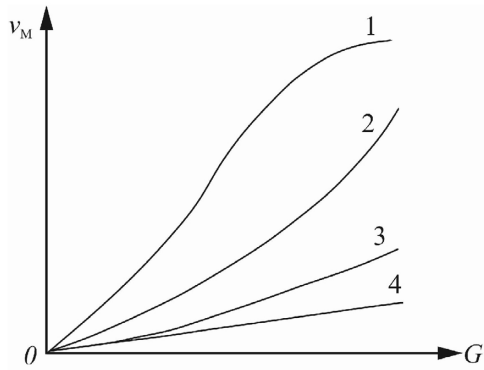


Fig. 4. Dependence of the drilling rate ( $v_M$ ) on the axial load  $G$  for different rocks: 1 – soft rocks; 2 – rocks of medium hardness; 3 – hard rocks; 4 – solid rocks

The higher the axial load is, the bigger the mechanical drilling rate is. The mechanical drilling rate under the axial load and constant rotation rate increases faster than in case of the increase of the rotation rate under constant axial load. Ideal curve (in this case — direct line) of the dependence of mechanical drilling rate on the axial load on the bore bit looks as follows (Fig. 5):

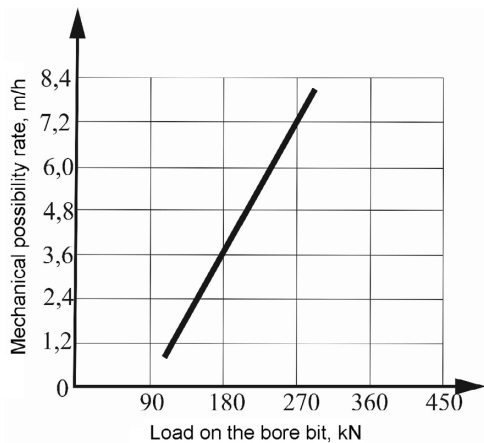


Fig. 5. Dependence of the mechanical drilling rate on the load on the bore bit

The dependence of the mechanical drilling rate on the angular rotation rate of the bore bit is shown on Fig. 6.

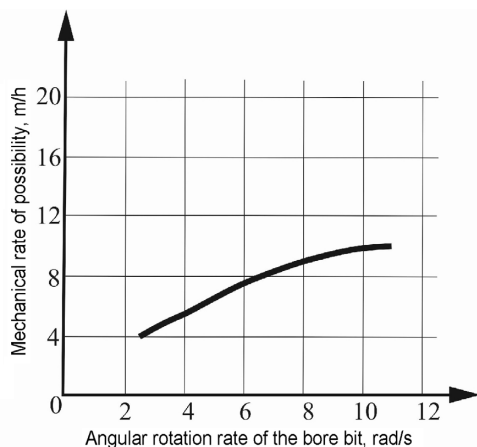


Fig. 6. Dependence of the mechanical drilling rate on the angular rotation rate of the bore bit

In a greater degree, the curve corresponding to the reality has a more complex appearance. Its site  $Oa$  corresponds to the surface destruction of the rock, and sites  $ab$  and  $bc$  — to fatigue-volume and volume ones respectively. Fitting of the curve at the sites  $Oa$  and

$ab$  is mainly determined by the regularities of rock destruction, and at the site  $bc$ , apart from them, by the geometry (primarily, by the height of working elements of the bore bits) of teeth of the cutting tool.

As it is known, power dependence of the mechanical drilling rate  $v$  on the load on the bore bit  $G$  [10, 248] and its rotation frequency  $n$  was obtained by empiric way (herewith, there were forced vibrations of the bore bit [7, 27]); the dependence:

$$v = a \cdot n^x \cdot G^y,$$

where the values of  $a$ ,  $x$  and  $y$  are defined by the properties of rocks [11, 215]. For instance, in case of a turbine drilling in the rocks of Kashirskian set  $x = 0.7$ ;  $y = 1.1$ ;  $a = 0.0024$  [6, 2–3].

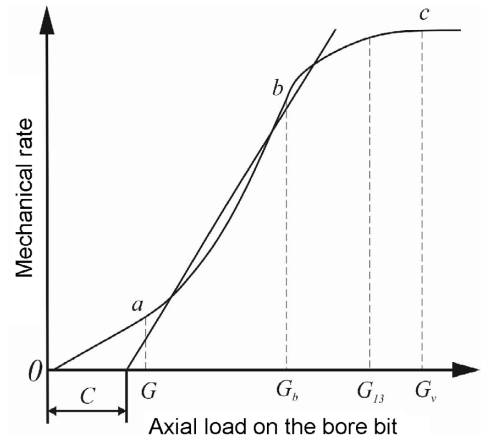


Fig. 7. Dependence of the mechanical drilling rate on the axial load on the bore bit

By the way, the mechanical drilling rate depends not only on the properties of the rock, but also on the degree of cleaning of the bottom hole of the well.

Ineffective removal of sludge leads to the reduction of both, mechanical drilling rate and to the fact that this function reaches maximum at lower values of axial load.

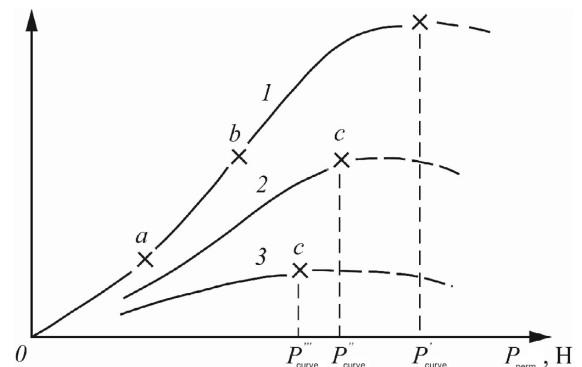


Fig. 8. Dependence of change of the mechanical drilling rate  $v_M$  on the axial load  $P_{perm}$  and presence of sludge in the drilling well

Figure 8 shows that the curve 1 corresponds to drilling under absolute cleaning of the bottom hole of the well; the curve 2 — to the so called normal position at the bottom hole of the well, when sludging-up of the well does not exceed  $1/4$  of the height of the lowest teeth of the roller cone bit; the curve 3 — to drilling under the unsatisfactory wash-down of the well.

The aim to increase productivity in drilling with roller cone bits forces the drillers to speed up the regime of drilling at the expense of increase of axial load on the bore bit and reduction of rotation rate, which leads to reduction of amortization of the bore bit. At the same time, the increase of axial load contributes to the increase of intensity of deflection. This is the problem we faced in our company.

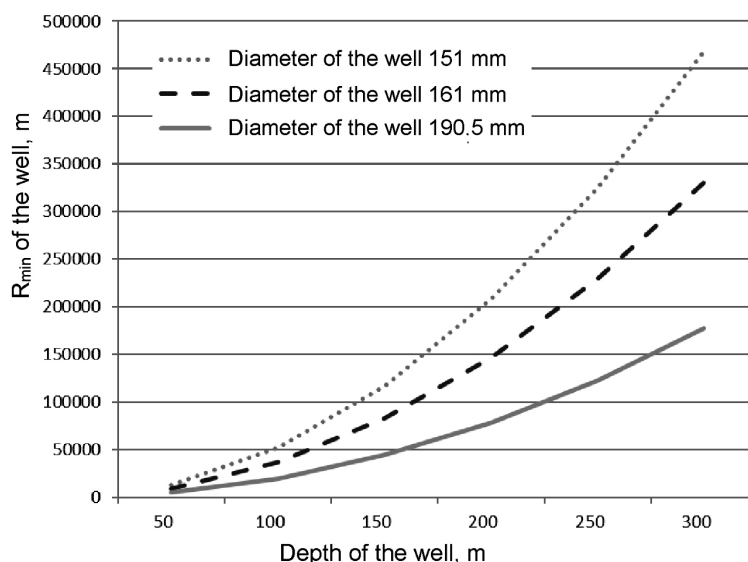


Fig. 9. Dependence of  $R_{\min}$  for different diameters of the well bore

After several natural experiments, the reason of well deflection was detected. It was so called «squeezing», excess, not corresponding to the torque of drilling equipment, load on the bottom hole of the well. To eliminate this problem, drilling was done without additional load created by the hydraulics (so called «leaning» drilling).

Withdrawal from squeezing that provoked the deflection of the well bore was a not less important factor to ensure straightness of wells compared to the use of bentonite drilling mud.

An obstacle in the form of a stone on the way of the drilling equipment can be another reason of deflection of the well bore. The optimal way to overcome it is to carefully cut it out with the core bit and, then, continue drilling with the roller cone bit.

The permissible radius of deflection of water supply wells is determined considering various factors.

**Firstly, it is a minimally permissible radius of bore deflection calculated on the basis of conditions of possibility of all equipment along the well.** Herewith, it is taken into account whether the running-in of the equipment and casing pipes is possible under the effect of their own weight. The minimal deflection is permitted, but, naturally, without remaining deformation. If the forced running-in is not possible, there should be a gapping between the equipment and walls of the well, the size of which is accepted equal to 1.5–3.0 mm. In general case, the minimal radius of deflection  $R_{\min}$ , from this point of view, is defined quite precisely under the formula:

$$R_{\min} = \frac{L^2}{8(D-d-k)},$$

where:  $L$  is the length of the run-in equipment, m;  $d$  — its diameter, m;  $D$  — diameter of the well or internal diameter of the respective casing string depending on the initial conditions of calculation, m;  $k$  — required gapping, m.

**Secondly, to avoid the destruction of well walls during the operations of running-in and lifting, the minimal radius of deflection  $R$  should satisfy the following condition:**

$$R > \frac{Pl}{F_{perm}},$$

where:  $P$  — straining of the drilling string under the lifting of the equipment, kN;

$l$  — distance between locks, m;

$F_{perm}$  — permissible force of application of the lock to the well wall, kN.

At depths up to 1000 m,  $F_{perm} = 10$  kN, in case of solid rocks,  $F_{perm}$  can be extended to 40–50 kN.

**Thirdly, for the normal exploitation of drilling and casing strings, i. e. to avoid the excess of permissible values of stress in the pipes at the expense of bending in the deflected intervals, the minimal radius of deflection  $R_{\min}$  should be as follows:**

$$R_{\min} = \frac{E \cdot d}{2[S_{bend}]},$$

where:  $E$  — modulus of elasticity, mPa/mm<sup>2</sup>;

$d$  — external diameter of pipes, mm;

$[S_{bend}]$  — permissible stress of bending, mPa/mm<sup>2</sup>.

Having defined the minimal radii under the formula, one chooses the biggest, based on which the following design is carried out.

**The experience presented in the article is another proof of a known thesis — «Walk and ye shall reach». The fact that the technology of construction of water supply wells has tendency for wider use of uPVC casing pipes is certain. The experience of those who made first, meaning, most difficult and important steps on this path are especially significant.**

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## Substantiating theoretically the parameters of the blade in-built in the drum group of shelling installation

**Abstract:** In article results that the curve-lined external let's substantiated dimensions of curve-lined external of the blade laterals, which has curve lined externals, mounted inside the drum of mobile shelling installation; in a purpose to form a curve-lined external by means of integral graphics method let's divide into parts the second order differential formula are resulted. As obtained calculations show that the curve-lined external of the blade laterals that means the externals of left side lateral radials are equal to  $R_1 = 1601.0$  mm.,  $R_2 = 339.0$  mm.,  $R_3 = 159.02$  mm.;  $R_4 = 186.84$  mm. and  $R_5 = 601.5$  mm.; the slope angles  $\alpha_1 = 24^\circ 28'$ ,  $\alpha_2 = 27^\circ 09'$ ,  $\alpha_3 = 31^\circ 49'$ ,  $\alpha_4 = 27^\circ 08'$  and  $\alpha_5 = 31^\circ 49'$ ; the length  $L_h = 552.4$  mm.; as above said the right side lateral is in the same formation with the drum wall and its length is unchangeable i. e. —  $L_l = L_h$ .

**Keywords:** agricultural seeds, mobile shelling installation, semi machine screw shaped blade, blade having curve lined externals, shelling, technologic process.

It is known that seeds of a certain agricultural sowings having improper formed structure and due to not a higher level of its free-running, will not give to seed at lower rates or exactly hole by hole on a ground. Considering these matters, in a purpose to make round formation and increase the free-running of agricultural crops it is proposed to implement shelling technology by using protecting-feeding compounds [1].

After applied the proposing shelling technology the round shaped higher level free-running seeds as well as almost with the same geometric sizes seed grains will come out. In its turn it will facilitate seeding the agricultural crops' seeds having improper formed structure and not a higher levelled free-running, at lower rates or exactly hole by hole on a ground.

On a basis of the shelling technology of agricultural seeds, the process of shell layer forming are carried out in due sequence order. In effort to form the shell layer the seeds firstly will be moistened by using glue and promoting typed liquid. In the shelling process the seeds inspired by the centrifugal force as well as at the account of sticking glue typed liquid begin to act together with the drum group basement and walls. The seed grains motion in proper way will result in unequal distribution of treated chemicals and shelling layer forming fistular fillers above side of seeds. It outcomes in not complete finishing the shelling technological process of the agricultural crops' grain seeds in the shelling installation and the smooth covering will not be formed at grains seeds externals [2].

Considering all above it is proposed to mount the semiscrew typed blade inside the drum group of shelling installation [3]. The

semiscrew typed blade together with drum group basement and walls selects out the acting grain seeds and thus it disturbs the sequent order. But due to that the lower side of the semiscrew typed blade has a straight lined external and mounted crosswise to grain seeds action, the grain seeds are knocked to the blade at higher strength and their motion direction changes.

Due to that the semiscrew typed blade is mounted inside the drum group at  $\gamma = 16-25^\circ$  degrees angle than the vertical axis, the grain seeds stop moving at the culmination peak, the angle rate equals to zero. In the event if semiscrew typed blade is installed at small angle than the vertical axis, the moving distance of the seeds inside the drum group will shorten and the layer of unmovable seed drains will be formed. In such cases a certain part of seed grains is not equally be separated together with protective feeding mixtures but it results in not perfectly and completely implementation of the shelling technologic process at required level.

Taking into consideration of all above specified it is proposed to mount the blade with curve-lined externals inside a drum group of the mobile shelling installation. Proposed the blade with curve-lined externals sticks to the drum group basement and walls; by not decreasing the angles rate of the moving seed grains it separates them from the drum group basement and walls and in this case it disturbs the its sequent order motion. In effort for the curve-lined blade to separate the grain seeds from the drum walls completely it is necessary to fabricate same with drum wall as well as it doesn't shorten the distance occurring along with around the wall sides of the drum unit, should provide changing in movement direction.

The drum unit of the mobile shelling installation and semi-crew typed and the blades with curve-lined externals mounted inside it are shown in the figure 1.

Considering the change in movement direction by not shortening the rates of the grain seeds acting inside the drum unit in sequence, for the purpose to substantiate the blade formation having curve-lines external let's try to solve this matter by applying the differential formula of the second order [4]. To achieve the target let's divide the curve line forming curve-lined externals into several parts and pass cross sections along with the bows.

The status of the curve line forming curve-lined externals separated into several parts and pass cross sections along with the bows are shown in the figure 2.

Values of the length  $a$  and the height  $h$  of the cross section passed through the bow in the figure b is known and due to that radials  $R$  and slope angles  $\alpha$  of curve-lined parts can be found from the following solutions.

$$R = \frac{\alpha}{2 \sin \frac{\alpha}{2}}; \quad (1)$$

$$h = \frac{\alpha}{2} \operatorname{tg} \frac{\alpha}{4}. \quad (2)$$

Let's make several changes into (1) and (2) formulas, and settle the higher part radials of the curve-line external of the in-mounted blade inside the shelling installation drum group as in the following solutions:  $R_1 = 560.0$  mm.,  $R_2 = 560.06$  mm.,  $R_3 = 391.12$  mm.,  $R_4 = 505$  mm. and  $R_5 = 534.17$  mm., slope angles  $\alpha_1 = 24^\circ 28'$ ,  $\alpha_2 = 27^\circ 09'$ ,  $\alpha_3 = 31^\circ 49'$ ,  $\alpha_4 = 36^\circ 24'$  and  $\alpha_5 = 34^\circ 28'$ , length  $L_{\text{sur}} = 1082.3$  mm., radial dimensions of the lower curved externals  $R_1 = 401.0$  mm.,  $R_2 = 233.9$  mm.,  $R_3 = 163.4$  mm.,  $R_4 = 220$  mm. and  $R_5 = 217.5$  mm., slope angles  $\alpha_1 = 24^\circ 28'$ ,  $\alpha_2 = 27^\circ 09'$ ,  $\alpha_3 = 31^\circ 49'$ ,  $\alpha_4 = 36^\circ 24'$  and  $\alpha_5 = 34^\circ 28'$ , length  $L_n = 387.6$  mm.

On a basis of the radials calculated values of the curve-lined external separated into parts by using

$$R = \frac{1}{[\cos^3 \phi] f(x, y, \operatorname{tg} \phi)} \quad (3)$$

the above formula; as well as in a purpose to form a curve-lined external by means of integral graphics method let's divide into parts the second order differential formula [4]; let's combine the radials of bows separated into parts in effort to form a higher and lower curve lined externals of the blade mounted inside the drum group of the mobile (transportable) shelling installation. After all above carried out activities we can achieve the higher and lower curve lined externals of the blade mounted inside the drum group of the mobile shelling installation.

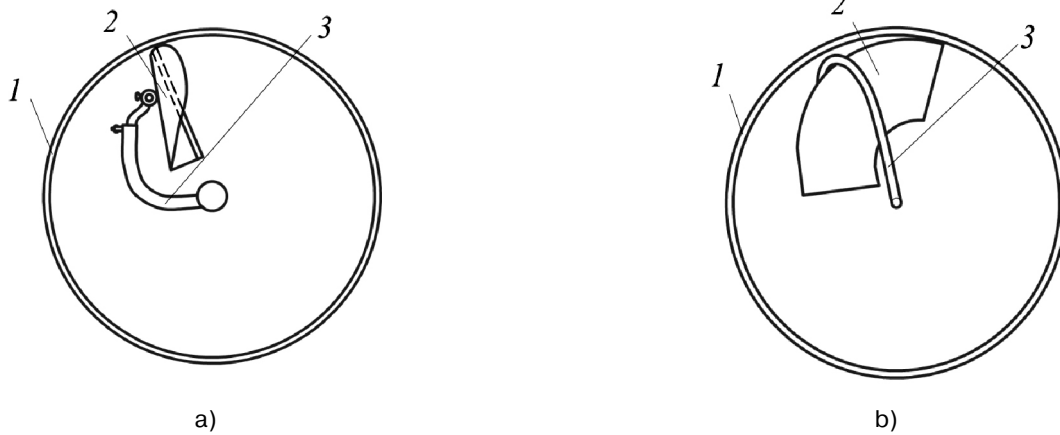


Fig. 1. Drum group of the mobile shelling installation and in-built blades: a) semi machine screw shaped blade; b) blade having curve lined externals. 1 — drum group; 2 — semi machine screw shaped blade and blade having curve lined externals; 3 — mounting support

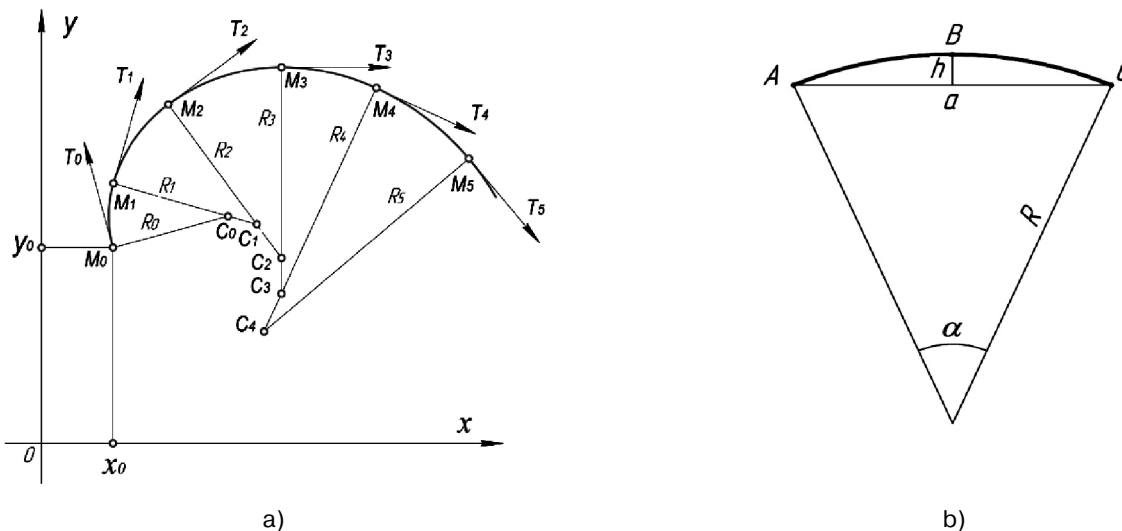


Fig. 2. The status of the curve lines separated into parts which forms curve-lined externals (a) and the condition (b) passing through cross section of the curve-lined part

In effort to settle the above specified formula and the curve-lined external let's substantiate dimensions of curve-lined external of the blade laterals, which has curve lined externals, mounted inside the drum of mobile shelling installation; in a purpose to form a curve-lined external by means of integral graphics method let's divide into parts the second order differential formula. As obtained calculations show that the curve-lined external of the blade laterals that means the externals of left side lateral radials are equal to  $R_1 = 1601.0$  mm.,  $R_2 = 339.0$  mm.,  $R_3 = 159.02$  mm.;  $R_4 = 186.84$  mm. and  $R_5 = 601.5$  mm.; the slope angles  $\alpha_1 = 24^\circ 28'$ ,  $\alpha_2 = 27^\circ 09'$ ,

$\alpha_3 = 31^\circ 49'$ ,  $\alpha_4 = 27^\circ 08'$  and  $\alpha_5 = 31^\circ 49'$ ; the length  $L_h = 552,4$  mm.; as above said the right side lateral is in the same formation with the drum wall and its length is unchangeable i. e. —  $L_1 = L_h$ .

Thus the blade having curve-lined externals formed by means of applying the integral graphics method of the second order differential formula is used to implement shelling of the agricultural seeds being treated at the shelling installation by not facing it to the powerful affection facilitates to changing its action at certain angle degrees. And in its turn it outcomes in the growth of efficiency in shelling process of the agricultural crops grain seeds at the shelling installation.

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## Modeling of dynamics of movement of fibres ulyuk a clap on a forward side of a tooth saw the cylinder of gin of the second step

**Abstract:** In article the technique of drawing up and the analytical decision of dynamics of movement of fibers ulyuk a clap on a forward side of a tooth saw the cylinder of gin of the second step is resulted. The analysis of movement of fibres ulyuk a clap from the cores system parametres is given.

**Keywords:** A clap, ulyuk, dynamics, movement, force of coupling, a friction, weight, frequency, amplitude.

In process fiber branch taking into account recycled ulyuk at dragging fibers ulyuka teethes saw the cylinder it is necessary for second step to overcome force of a friction between a fibre and weight raw chambers which depends basically on its density. If fibers ulyuk moves on a saw tooth, they will drop out of it what to lead to fibre returning uluk in raw the chamber at the expense of its small density. Therefore it is necessary to create sufficient force dragging fibers ulyuk. Thus force dragging fibers ulyuk from raw chambers of gin of the second step should be less, than force of breakage of fibers [1].

It is necessary to notice, that at dragging fibers ulyuk, fibers can move on a forward side of a tooth saw the cylinder. If movement of fibers aside to tooth top fibers it will not be pulled out from raw

chambers. Dragging can be only at motionless position or movement of fibers towards the basis of teethes saw the cylinder. Therefore theoretical studying of movement of fibers ulyuk on a forward surface of a tooth raw the cylinder is important.

On fig. 1 the settlement scheme of capture and dragging by a tooth saw the cylinder of fibers ulyuk in saw gin of the second step is presented. For a conclusion of the equation describing movement of fibers ulyuk on a forward surface of a tooth saw of the cylinder it is accepted following assumptions: fibers ulyuk to consider as the concentrated weight; movement to occur only on a forward surface of a tooth; in a kind in comparison with other forces aerodynamic force without taking into account; saw the cylinder rotates with constant angular speed.

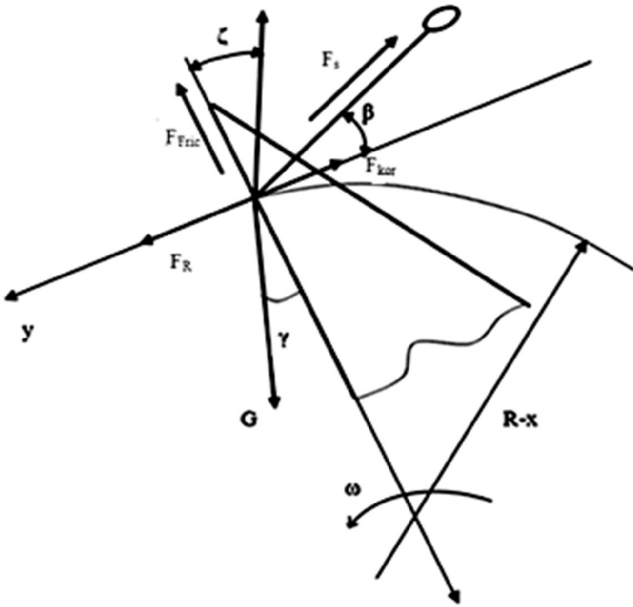


Fig. 1

Let's consider movement of fibers ulyuk on a surface of a forward side of a tooth saw the cylinder at influence on fibers ulyuk following forces:

$\bar{G}$  – force of weight of fibers ulyuk;  $\bar{F}_i$  – force of inertia;  $\bar{F}_s$  – centrifugal force;  $\bar{F}_{sr}$  – force of communication of a fibre with raw the chamber or force of resistance dragging fibers;  $\bar{F}_{kor}$  – cariol force;  $\bar{F}_f$  – force of a friction of a fibre on a lobby edge a tooth saw the cylinder;  $\bar{F}_r$  – force of reaction of a tooth on influence of fibers ulyuk. Taking into account a condition of balance of fibres ulyuk on a surface of a forward side of a tooth saw the cylinder taking into account principle Dalamber [2] it is possible to write down:

$$m\bar{a} = \bar{G} + \bar{F}_s + \bar{F}_{sr} + \bar{F}_{kor} + \bar{F}_f + \bar{F}_r, \quad (1)$$

where,  $m$  — the resulted weight of fibers ulyuk;  $\bar{a}$  — acceleration of fibres ulyuk on a forward surface of a tooth saw the cylinder. The lobby rpan a saw tooth, is a plane.

Therefore movement of fibres it is considered on axes X and At. Projections (2) on an axis of coordinates X and At we will receive in a kind:

$$\begin{aligned} m\ddot{x} &= \sum_1^n (F_{x1} + F_{x2} + F_{x3} + \dots + F_{xn}); \\ m\ddot{y} &= \sum_1^n (F_{y1} + F_{y2} + F_{y3} + \dots + F_{yn}), \end{aligned} \quad (2)$$

where,  $F_{x1}, F_{x2}, F_{x3}, \dots, F_{xn}$  and  $F_{y1}, F_{y2}, F_{y3}, \dots, F_{yn}$  — accordingly projection operating forces on axis X and At.

Thus we will write down the equations of projections of forces operating on fibres ulyuk on a forward surface of a tooth:

$$\begin{aligned} m\ddot{x} &= G \cos \gamma - F_{fr} - F_s \sin \beta - F_{sr} \cos \xi; \\ m\ddot{y} &= G \sin \gamma - F_{kor} - F_s \cos \beta - F_{sr} \sin \xi + F_r, \end{aligned} \quad (3)$$

where,  $\gamma = \omega t$  — a corner between a vector of force of weight and axis X;  $\beta$  — a corner between a vector of force of communication of fibres ulyuk with weight raw chambers or forces of resistance dragging with an axis At;  $\xi$  — a corner between a vector of centrifugal force with axis X.

Operating forces are defined from following expressions

$$\begin{aligned} G &= mg; F_{fr} = m\omega^2(R-x); F_{dr} = fF_r; \\ F_{sr} &= (\rho Vg + F_{ul}); F_{kor} = 2m\omega \dot{x} \cos \theta. \end{aligned} \quad (4)$$

Fibres ulyuk cannot be to move on an axis At as link between a fibre and a saw tooth is thus broken. Therefore we accept following conditions:  $\dot{y} = 0$ ;  $\ddot{y} = 0$ .

From the second equation (3) we define force of reaction  $F_r$  and taking into account the condition set forth above and substituting it in the first equation (3), carrying out some transformations we will receive:

$$\begin{aligned} \ddot{x} + 2f\omega \dot{x} \cos \theta - (\cos \xi - f \sin \xi)\omega^2 x &= g(\cos \omega t + f \sin \omega t) - \\ &- \omega^2 R(\cos \xi + f \sin \xi) - \frac{1}{m}(\rho Vg + F_{ul})(\cos \chi + f \sin \beta). \end{aligned} \quad (5)$$

The decision (5), describing movement of fibres ulyuk on axis X on a tooth surface saw the cylinder consists of two parts:

$$x = x_1 + x_2. \quad (6)$$

The decision for the left part of the equation (5) finds in a kind:

$$x = c_1 e^{k_1 t} + c_2 e^{k_2 t}. \quad (7)$$

Factors  $k_1$  и  $k_2$  it is defined according to [3; 4] by the decision of the equations:

$$\begin{aligned} k^2 + 2f\omega k - (\cos \xi - f \sin \xi)\omega^2 &= 0; \\ k_{1,2} &= -f\omega \pm \sqrt{f^2\omega^2 + (\cos \xi - f \sin \xi)\omega^2}. \end{aligned} \quad (8)$$

The received expression (8) substituting in (7) we will receive:

$$x_1 = c_1 e^{\left[\sqrt{f^2 + (\cos \xi - f \sin \xi)\omega^2} - f\right]\omega t} + c_2 e^{-\omega t \left[\sqrt{f^2 + (\cos \xi - f \sin \xi)\omega^2} + f\right]}. \quad (9)$$

From (6) decision of a root  $x_2$  it agree techniques resulted in [4] it is defined in a kind:

$$x_2 = A \cos \omega t + B \sin \omega t. \quad (10)$$

Taking twice derivatives from (10) it is had:

$$\begin{aligned} \dot{x} &= -\omega A \sin \omega t + \omega B \cos \omega t; \\ \ddot{x} &= -\omega^2 A \cos \omega t - \omega^2 B \sin \omega t. \end{aligned} \quad (11)$$

We substitute (11) in (5) and it is defined corresponding factors:

$$\begin{aligned} -\omega^2 A \cos \omega t - \omega^2 B \sin \omega t - 2f\omega^2 \sin \omega t + 2f\omega^2 B \cos \omega t - \\ -(\cos \xi - f \sin \xi)\omega^2 A \cos \omega t - (\cos \xi - f \sin \xi)\omega^2 B \sin \omega t = \\ = g(\cos \omega t + f \sin \omega t) - \omega^2 t - (\cos \xi + f \sin \xi) - \\ - \frac{1}{m}(\rho Vg + F_{ul})(\sin \beta + f \cos \beta). \end{aligned} \quad (12)$$

Comparing factors in (12) we will receive the following system of the equations:

$$\begin{aligned} -\omega^2 A + 2f\omega^2 B - (\cos \xi - f \sin \xi)\omega^2 A &= g; \\ -\omega^2 B \sin \omega t - 2f\omega^2 A - (\cos \xi - f \sin \xi)\omega^2 B &= fg. \end{aligned}$$

Here accordingly factors and in are defined from expressions:

$$\begin{aligned} A &= \frac{g(1 + \cos \xi - f \sin \xi) - 2f^2 g}{\omega^2(1 + \cos \xi - f \sin \xi)^2 + 4f^2 \omega^2}; \\ B &= \frac{(1 + \cos \xi - f \sin \xi)\omega^2 A - g}{2f\omega^2}. \end{aligned} \quad (13)$$

Private the decision of the equation (5) describing movement of fibres ulyuk on a surface of a tooth of a saw we will receive in a kind:

$$\begin{aligned} x_2 &= \frac{g(1 + \cos \xi - f \sin \xi) - 2f^2 g}{\omega^2(1 + \cos \xi - f \sin \xi)^2 + 4f^2 \omega^2} \cos \omega t + \\ &+ \frac{(1 + \cos \xi - f \sin \xi)\omega^2 A - g}{2f\omega^2} \sin \omega t. \end{aligned} \quad (14)$$

Thus the decision for the left part (5) and the private decision (14) develop, which define the problem common decision the law of movement of fibres ulyuk on axis X on a forward surface of a tooth saw looks like the cylinder:

$$\begin{aligned} x &= c_1 e^{\left[\sqrt{f^2 + (\cos \xi - f \sin \xi)\omega^2} - f\right]\omega t} + c_2 e^{-\omega t \left[\sqrt{f^2 + (\cos \xi - f \sin \xi)\omega^2} + f\right]} + \\ &+ \frac{g(1 + \cos \xi - f \sin \xi) - 2f^2 g}{\omega^2(1 + \cos \xi - f \sin \xi)^2 + 4f^2 \omega^2} \cos \omega t + \\ &+ \frac{(1 + \cos \xi - f \sin \xi)\omega^2 A - g}{2f\omega^2} \sin \omega t. \end{aligned} \quad (15)$$

Taking into account entry conditions at  $t = 0$ ,  $x = 0$ ,  $\dot{x} = 0$  it is possible to define integration constants  $c_1$  and  $c_2$ :

$$\begin{aligned}
 c_1 + c_2 + \frac{g(1 + \cos \xi - f \sin \xi) - 2f^2 g}{\omega^2(1 + \cos \xi - f \sin \xi)^2 + 4f^2 \omega^2} \cos \omega t + \\
 + \frac{(1 + \cos \xi - f \sin \xi) \omega^2 A - g}{2f \omega^2} \sin \omega t - \\
 - \left[ R - \frac{(\rho V g + F_{mp1})(\sin \beta + f \cos \beta)}{(\cos \xi - f \sin \xi) m \omega^2} \right] = 0; \\
 \omega \left[ c_1 (\sqrt{f^2 + (\cos \xi - f \sin \xi)} - f) + c_2 (\sqrt{f^2 + (\cos \xi - f \sin \xi)}) \right] + \\
 + \frac{(1 + \cos \xi - f \sin \xi) \omega^2 A - g}{2f \omega^2} = 0; \\
 c_1 = \left[ R - \frac{(\rho V g + F_{mp1})(\sin \beta + f \cos \beta)}{(\cos \xi - f \sin \xi) m \omega^2} \right] - \\
 - c_2 - \frac{g(1 + \cos \xi - f \sin \xi) - 2f^2 g}{\omega^2(1 + \cos \xi - f \sin \xi)^2 + 4f^2 \omega^2} \cos \omega t - \\
 - \frac{(1 + \cos \xi - f \sin \xi) \omega^2 A - g}{2f \omega^2} \sin \omega t; \\
 c_2 = \frac{g - (1 + \cos \xi - f \sin \xi) \omega^2 A}{4f^2 \omega^3} - \\
 - \frac{1}{2f} \left\{ \left[ R - \frac{(\rho v g + F_{mp1})(\sin \beta + f \cos \beta)}{(\cos \xi - f \sin \xi) m \omega^2} \right] - \right. \\
 - \frac{g(1 + \cos \xi - f \sin \xi) - 2f^2 g}{\omega^2(1 + \cos \xi - f \sin \xi)^2 + 4f^2 \omega^2} \cos \omega t + \\
 \left. + \frac{(1 + \cos \xi - f \sin \xi) \omega^2 A - g}{4f^2 \omega^2} \sin \omega t \right\} \times \\
 \times (\sqrt{f^2 + (\cos \xi - f \sin \xi)} - f).
 \end{aligned} \quad (16)$$

Delivering values  $c_1$  and  $c_2$  in (15) we will definitively receive expression describing movement of fibres ulyuk on a tooth surface saw the cylinder.

$$\begin{aligned}
 x_1 = & \left\{ \left[ R - \frac{(\rho V g + F_{mp1})(\sin \beta + f \cos \beta)}{(\cos \xi - f \sin \xi) m \omega^2} \right] - c - \right. \\
 & - \frac{g(1 + \cos \xi - f \sin \xi) - 2f^2 g}{\omega^2(1 + \cos \xi - f \sin \xi)^2 + 4f^2 \omega^2} \cos \omega t - \\
 & \left. - \frac{(1 + \cos \xi - f \sin \xi) \omega^2 A - g}{2f \omega^2} \sin \omega t \right\} e^{\left[ \sqrt{f^2 + (\cos \xi - f \sin \xi) \omega^2} - f \right] \omega t} + \\
 & + \left\{ \frac{g - (1 + \cos \xi - f \sin \xi) \omega^2 A}{4f^2 \omega^3} - \right. \\
 & - \frac{1}{2f} \left\{ \left[ R - \frac{(\rho v g + F_{mp1})(\sin \beta + f \cos \beta)}{(\cos \xi - f \sin \xi) m \omega^2} \right] - \right. \\
 & - \frac{g(1 + \cos \xi - f \sin \xi) - 2f^2 g}{\omega^2(1 + \cos \xi - f \sin \xi)^2 + 4f^2 \omega^2} \cos \omega t + \\
 & \left. + \frac{(1 + \cos \xi - f \sin \xi) \omega^2 A - g}{4f^2 \omega^2} \sin \omega t \right\} \square \\
 & \square (\sqrt{f^2 + (\cos \xi - f \sin \xi)} - f) e^{-\omega t \left[ \sqrt{f^2 + (\cos \xi - f \sin \xi) \omega^2} + f \right]} + \\
 & + \frac{g(1 + \cos \xi - f \sin \xi) - 2f^2 g}{\omega^2(1 + \cos \xi - f \sin \xi)^2 + 4f^2 \omega^2} \cos \omega t + \\
 & + \frac{(1 + \cos \xi - f \sin \xi) \omega^2 A - g}{2f \omega^2} \sin \omega t.
 \end{aligned} \quad (17)$$

The analysis shows, that process dragging fibres ulyuk a tooth saw the cylinder from raw chambers saw fibre branch the second step occurs basically in the absence of movement of fibres on a surface of a tooth of a saw, at  $x = 0$ ,  $\dot{x} = 0$ ;  $\ddot{x} = 0$ .

The law of movement of fibres ulyuk on a forward side of a tooth saw the cylinder has in the cores oscillatory parametre with frequency  $\omega t$  and amplitude, depends, a set of values of weight of a bunch of fibres ulyuk, factor of a friction and a corner of an arrangement of fibres concerning an axis saw the cylinder. Problem decisions it is numerically possible to define necessary conditions of weight in saw gin of the second step.

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## Definition of movement laws of winging and milling drums of the unit for processing of soil and crops of seeds

**Abstract:** In article the settlement scheme and mathematical model of five-mass system of the combined unit for processing of soil and crops of seeds are resulted. On the basis of numerical decisions of system of the differential equations laws of

movement milling and wing unit shaft are received, graphic dependences of change of parametres of the combined unit for processing of soil and crops of seeds are defined and recommendations for choice rational values of parametres and modes of movement of working bodies are given.

**Keywords:** The combined unit, the settlement scheme, soil, processing, the differential equations, movement laws milling, wing a drum, seeds, angular speed, the moment.

In the basic economy in crops, the structure of the top layer of earth makes difficultly crushing lumps (diameter of 5 sm. and more). This circumstance negatively influences to preparation of soil and quality of crops of small seeds of cultures, and, also in further and their shoots.

We develop an effective design of the combined unit for preseedling processing of soil and crops of small seeds vegetable cultures [1]. The kinematic scheme of the combined unit is resulted fig. 1, and the settlement scheme five mass machine units resulted fig. 2.

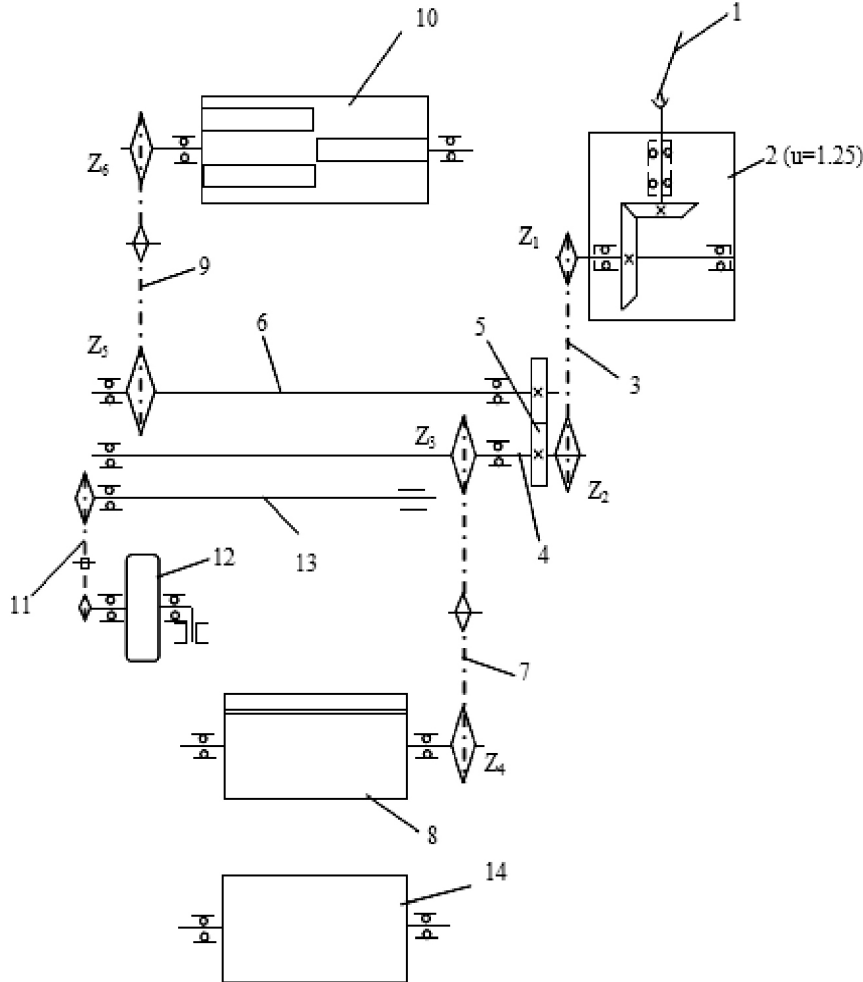


Fig. 1. The kinematic scheme of the combined unit: 1 – kardan; 2 – conic reducer; 3, 7, 9, 11 – chain drivers; 4, 6 – shaft; 5 – cylindrical gear wheel; 8 – winging drum; 10 – milling drum; 12 – basic wheel; 13 – shaft of the bobbin sowing device; 14 – skating rink

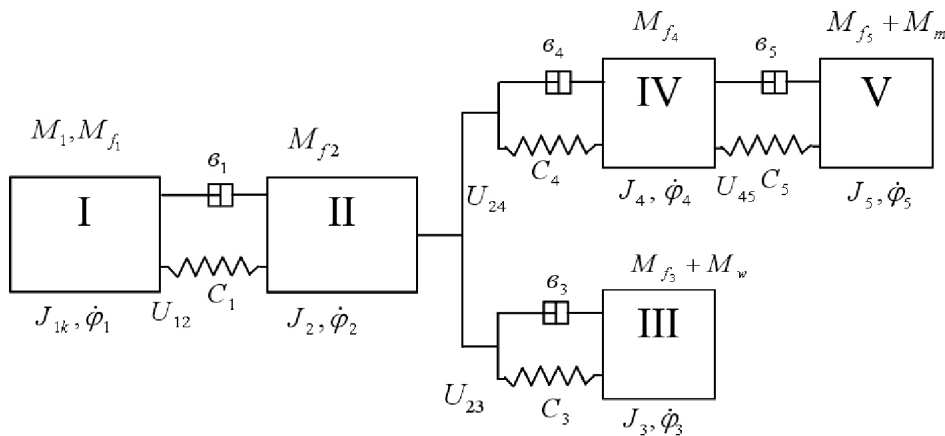


Fig. 2. The settlement scheme of the five-mass machine unit

According to fig. 2 the system of the differential equations, describing movement of weights of the machine unit of the car for processing of soil and crops of seeds [2] is deduced:

$$\begin{aligned}
 M_1 &= M_{vom} - K_1 \frac{d\phi_1}{dt} \\
 [(J_{r1} + J_{k1})u_p^2 + J_{r2} + J_{a1} + J_{k2}] \cdot \frac{d^2\phi_1}{dt^2} &= M_1 - M_{f1} - \\
 -C_1(\phi_1 - U_{12}\phi_2) - \varepsilon_1 \left( \frac{d\phi_1}{dt} - U_{12} \frac{d\phi_2}{dt} \right); \\
 [(J_{r3} + J_{a2} + J_{g1} + J_{a3}) + (J_{r4} + J_{a5} + J_{g2})u_p^2] \cdot \frac{d^2\phi_2}{dt^2} &= U_{12}C_1(\phi_1 - U_{12}\phi_2) \\
 -C_2(\phi_2 - U_{23}\phi_3) - C_2(\phi_2 - U_{24}\phi_4) + \varepsilon_1 U_{12} \left( \frac{d\phi_1}{dt} - U_{12} \frac{d\phi_2}{dt} \right) - \\
 -\varepsilon_2 \left( \frac{d\phi_2}{dt} - U_{23} \frac{d\phi_3}{dt} \right) - \varepsilon_2 \left( \frac{d\phi_2}{dt} - U_{24} \frac{d\phi_4}{dt} \right) - (M_{f1} + M_{f2}); \\
 (J_w + J_{r5} + J_{a4}) \cdot \frac{d^2\phi_3}{dt^2} &= U_{23}C_2(\phi_2 - U_{23}\phi_3) + \\
 + U_{23}\varepsilon_2 \left( \frac{d\phi_2}{dt} - U_{23} \frac{d\phi_3}{dt} \right) - (M_{f3} + M_w); \\
 \frac{J_{a6} d^2\phi_4}{dt^2} &= U_{24}C_2(\phi_2 - U_{24}\phi_4) - C_3 \left( \phi_4 - \left( \frac{r_2 \cos(\phi_2' + \Delta\phi_2)}{r_1 \cos\phi_1} \right) \phi_5 \right) \\
 + U_{24}\varepsilon_2 \left( \frac{d\phi_2}{dt} - U_{24} \frac{d\phi_4}{dt} \right) - \varepsilon_3 \left( \frac{d\phi_4}{dt} - \left( \frac{r_2 \cos(\phi_2' + \Delta\phi_2)}{r_1 \cos\phi_1} \right) \frac{d\phi_5}{dt} \right) - M_{f4}; \\
 (J_m + J_{r6} + J_{a6}) \cdot \frac{d^2\phi_5}{dt^2} &= \left( \frac{r_2 \cos(\phi_2' + \Delta\phi_2)}{r_1 \cos\phi_1} \right) \times \\
 \times C_3 \left( \phi_4 - \left( \frac{r_2 \cos(\phi_2' + \Delta\phi_2)}{r_1 \cos\phi_1} \right) \phi_5 \right) + \left( \frac{r_2 \cos(\phi_2' + \Delta\phi_2)}{r_1 \cos\phi_1} \right) \times \\
 \times \varepsilon_3 \left( \frac{d\phi_4}{dt} - \left( \frac{r_2 \cos(\phi_2' + \Delta\phi_2)}{r_1 \cos\phi_1} \right) \frac{d\phi_5}{dt} \right) - (M_{f5} + M_m). \quad (1)
 \end{aligned}$$

Where,  $M_{vom}$  – moment on shaft VOM;  $M_{f1}, M_{f2}, M_{f3}, M_{f4}, M_{f5}$  – the moments of forces a friction in corresponding shaft;  $M_w, M_m$  – the resistance moments on shaft wing and milling drums;  $\phi_1, \phi_2, \phi_3, \phi_4, \phi_5$  – angular movings of weights of the machine unit;  $J_{r1}, J_{r2}, J_{r3}, J_{r4}, J_{r5}, J_{r6}$  – the moments of inertia of rotating shaft;  $J_{k1}, J_{k2}$  – the moments of inertia of cogwheels of a conic reducer;  $J_{a1}, J_{a2}, J_{a3}, J_{a4}, J_{a5}, J_{a6}$  – the moments of inertia of asterisks of chain transfers accordingly;  $J_w$  – the moment inertia wing a drum;  $J_m$  – the moment of inertia of a milling drum;  $J_{g1}, J_{g2}$  – the moments of inertia of cogwheels of a cylindrical gearing tooth;  $u_p$  – transfer relation of a conic reducer;  $C_1, C_2, C_3, C_4, C_5$  – factors rigidity of chain transfers;  $\varepsilon_1, \varepsilon_2, \varepsilon_3, \varepsilon_4, \varepsilon_5$  – factors viscosity chain

transfers;  $U_p, U_{12}, U_{23}, U_{24}$  – the transfer the relation between rotating in weights accordingly.

The decision of system (1) is made on the type COMPUTER «Pentium-IV». The problem dard with application of numerical method Runge-Kutta by means of the mathematical program «Math Cad». The decision was carried out at following numerical values of parameters:  $M_{vom} = 1061.6 \text{ Nm}$ ,  $M_{f1} = 0.7848 \text{ Nm}$ ,  $M_{f2} = 0.233 \text{ Nm}$ ,  $M_{f3} = 1.04 \text{ Nm}$ ,  $M_{f4} = 1.36 \text{ Nm}$ ,  $M_{f5} = 0.7848 \text{ Nm}$ ,  $M_w = 41 \text{ Nm}$ ,  $M_m = 76.9 \text{ Nm}$ ,  $J_{a1} = 0.0006 \text{ kgm}^2$ ,  $J_{a2} = 0.00117 \text{ kgm}^2$ ,  $J_{a3} = 0.000268 \text{ kgm}^2$ ,  $J_{a4} = 0.00118 \text{ kgm}^2$ ,  $J_{a5} = 0.00086 \text{ kgm}^2$ ,  $J_{a6} = 0.00187 \text{ kgm}^2$ ,  $J_{r1} = 0.0088 \text{ kgm}^2$ ,  $J_{r2} = 0.0064 \text{ kgm}^2$ ,  $J_{r3} = 0.0016 \text{ kgm}^2$ ,  $J_{r4} = 0.0016 \text{ kgm}^2$ ,  $J_{r5} = 0.00026 \text{ kgm}^2$ ,  $J_{r6} = 0.00056 \text{ kgm}^2$ ,  $J_{k1} = 0.0064 \text{ kgm}^2$ ,  $J_{k2} = 0.0073 \text{ kgm}^2$ ,  $J_g = 0.0375 \text{ kgm}^2$ ,  $J_\phi = 0.11088 \text{ kgm}^2$ ,  $J_{g1} = 0.0027 \text{ kgm}^2$ ,  $J_{g2} = 0.0027 \text{ kgm}^2$ ,  $U_p = 1.25$ ,  $U_{12} = 1.2$ ,  $U_{23} = 1.3$ ,  $U_{24} = 1.2$ .

Based on the decision of system (1) laws of change of angular speeds  $\dot{\phi}_m, \dot{\phi}_w$  and moments  $M_m, M_w$  corresponding shaft milling and wing drums (fig. 3) are received. The analysis and processing of the received laws receive graphic dependences of change of scope of fluctuations  $\Delta\dot{\phi}_m, \Delta M_m, \Delta\dot{\phi}_w$  and  $\Delta M_w$ . From the received dependences it is visible, that with increase in resistance from processed soil considerably increases average values of scope of fluctuations  $\Delta M_m, \Delta M_w, \Delta\dot{\phi}_m$  and  $\Delta\dot{\phi}_w$  on nonlinear law. But, thus increase  $\Delta M_m$  and  $\Delta\dot{\phi}_m$  will be considerable rather than increase  $\Delta M_w$  and  $\Delta\dot{\phi}_w$ . This results from the fact that external loading directly operates on a milling drum. So, at increase in resistance of soil from 20 Nm. to 105 Nm.  $\Delta M_m$  increases from 8.2 Nm. to 20.4 Nm., and  $\Delta M_w$  increases from 4.1 Nm. to 13.1 Nm. Accordingly  $\Delta\dot{\phi}_m$  increases from 1.18 1/s to 2.26 1/s, and  $\Delta\dot{\phi}_w$  from 0.54 1/s to 1.38 1/s.

In fig.5. the laws of change  $\dot{\phi}_m, \dot{\phi}_w$  and  $M_m, M_w$  changes of loading from sowing seeds with the mixed loosened soil are presented. The received graphic dependences are resulted on fig. 6. The analysis of the received graphic dependences shows, that with increase in loading from sowing seeds with the crushed soil leads to reduction of angular speeds  $\dot{\phi}_m$  and  $\dot{\phi}_w$  on nonlinear law (curves 1, 2 see, fig. 6). Thus change  $\dot{\phi}_w$  and  $M_w$  will be intensive, rather than changes  $\dot{\phi}_m$  and  $M_m$ . So, at increase of the moment of resistance from sowing seeds and the crushed soil from 17 Nm. to 76 Nm.  $\dot{\phi}_w$  decreases from 21 1/s to 10 1/s, and  $\dot{\phi}_m$  from 31.6 1/s to 20.6 1/s. Thus the moments on shaft increase,  $M_w$  from 39 Nm. to 66 Nanometers, and  $M_m$  61 Nm. to 82 Nm.

For maintenance of necessary non-uniformity of movement milling and winging drums and also the maximum decrease in loading on a drive unit work is recommended at  $M_m = 70 - 85 \text{ Nm}$ ,  $M_w = 35 - 45 \text{ Nm}$ .

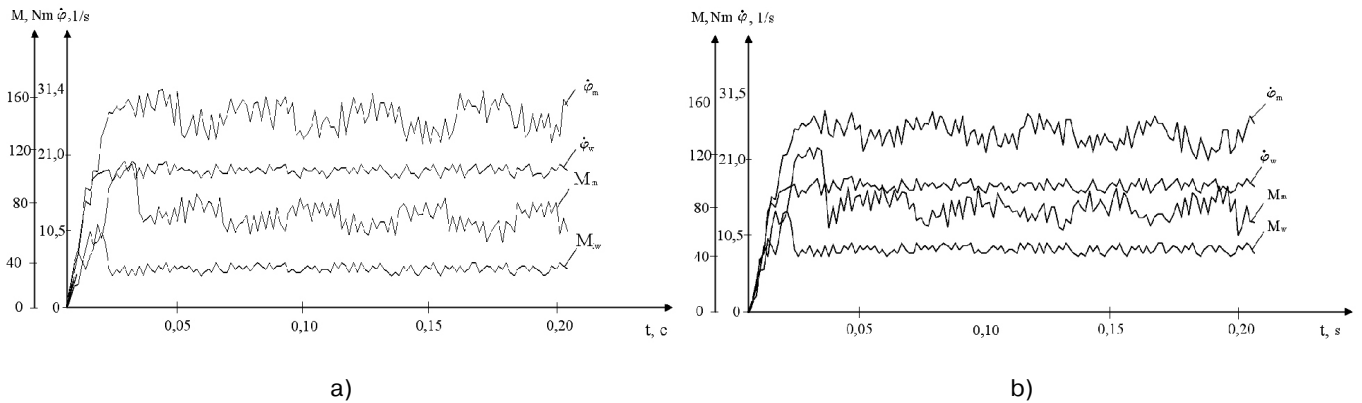


Fig. 3. Laws of change of angular speeds and the moments on shaft milling and winging drums:

a) –  $M_{mc} = 95.5 \text{ Nm}$ ; b) –  $M_{mc} = 64.2 \text{ Nm}$

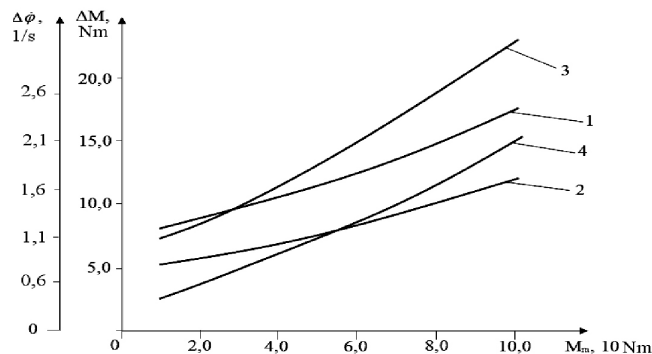


Fig. 4. Graphic changes of scope of fluctuations of angular speeds and the moments on shaft milling and winging drums from a variation of loading from processed soil: 1 –  $\Delta\dot{\phi}_m$ ; 2 –  $\Delta\dot{\phi}_w$ ; 3 –  $\Delta M_m$ ; 4 –  $\Delta M_w$

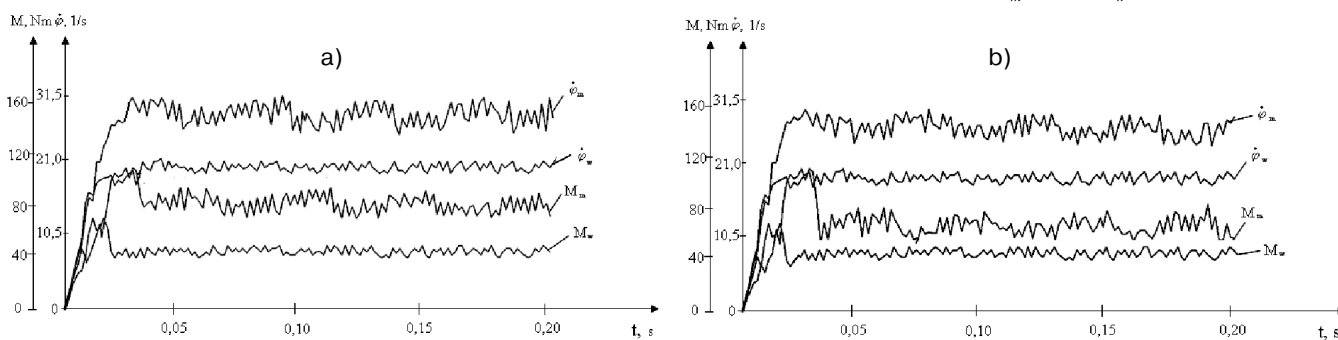


Fig. 5. Dependences of change  $\dot{\phi}_w$ ,  $\dot{\phi}_m$ ,  $M_w$  and  $M_m$  from variation  $M_{wc}$

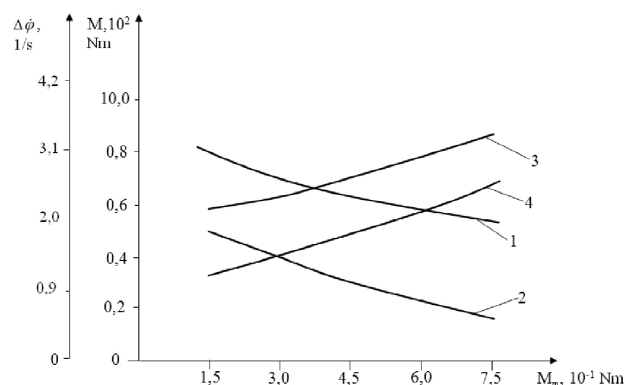


Fig. 6. Graphic dependences of change of average values of angular speeds and the moments on shaft milling and winging drums at a variation of loading from sowing seeds with the crushed soil: 1 –  $\dot{\phi}_m$ ; 2 –  $\dot{\phi}_w$ ; 3 –  $M_m$ ; 4 –  $M_w$

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**Experimental study of thermal strained state of reinforced concrete elements in natural conditions**

**Abstract:** Uneven distribution of temperature to RC-elements is cause to appearance of stress and deformations which are non-linear character. Such cyclical changing of temperature leads to appearing of micro-rifts on internal side of RC-elements.



By time such rift creating process reaches external side of RC-elements, which means contrary event to present methodics of calculating of rift-creating process under thermal stress.

Cyclical growth and reduce the stress on the cross section of the element inevitably leads to residual deformations in the concrete. Thus accumulating residual strains give rise to microfractures. The process of formation of micro-cracks occur in this case the outer surfaces of the structure, as is customary in the classical theory of reinforced concrete, and inside it. With time microcracks formation process reaches the outer layers of concrete, which already leads to the appearance of visible cracks on its surface in spite of calculation according to conventional techniques, according to which the fracture design must be provided.

**Keywords:** destructive processes, reinforced concrete, unintended deformation.

### Introduction

As you know the reliability and durability of reinforced concrete structures is connected directly not only with the stresses and force action on them, but with the conditions in which they are produced and operated. The most typical in this context for Central Asia and other regions with a predominance of dry hot climate are temperature and climate impacts that are complex and ambiguous, and raises a number of destructive processes in reinforced concrete. As a result of these effects in reinforced concrete structures often have unintended deformation, premature cracking and other negative phenomena, reducing their performance. The reason for these phenomena is an intensive dewatering of concrete, sudden changes in temperature and humidity during the day and throughout the year, which can lead to internal strains and stresses of concrete. In connection with this, important task is the objective consideration of these impacts during the design and calculation of reinforced concrete structures. To solve this problem it is necessary to have a real picture of the behavior of reinforced concrete elements under the influence of the ever-changing flow of the temperature, the nature of changes in external and internal temperature fields, taking into account their daily and seasonal fluctuations.

### Statement of the problem.

To this end, the department "Building construction" of Architecture and building Institute of Tashkent held special experimental studies. The object of research was the size of the fragments of beams  $120 \times 25 \times 18$  that were blind bore varying depth of normal section and under the influence of natural temperature and humidity in the climatic zone of Tashkent. Changes in temperature over the cross section of the concrete beams were fixed in two ways: using thermocouples of chromel-drops are laid in the beam during the concreting and mercury thermometers. The measurements were within 1.5 years, several times a day.

### Calculation of stress on the across of the sections

The investigations managed to get a real picture of the changes experienced by the normal temperature fields of concrete cross-section of the element caused by their thermal deformation and stress. Experiments have shown that under real conditions the temperature field of concrete and reinforced concrete structures over the cross section changes continuously over time, is non-stationary and nonlinear.

The uneven distribution of temperature causes in concrete and reinforced concrete elements of the thermal deformation and stress. Temperature deformation with small changes of stress are generally considered as elastic. However, our experiments have shown that with intensive changes in temperature and solar radiation there is non-uniform stress state of the cross section of the element and its own considerable strain exceeds the elastic limit.

The values of strain and stress on the cross section of the element depending on the measured values of temperature fields determined by the following procedure. The temperature distribution was determined by solving the heat equation for given initial boundary conditions. Calculation of temperature fields can be performed by

numerical methods. In this, the initial condition calculation is given constant volume and temperature of the circuit design

$$T = t'(x, y, z, T = 0). \quad (1)$$

The effects of temperature dependence between strains and stresses established by Hooke's law as the fundamental equation of thermoelasticity in this case,

$$\varepsilon_{(x,y,z)} = \frac{1}{E} \cdot [\sigma_{(x,y,z)} - \nu \cdot (\sigma_{(y,x,x)} + \sigma_{(z,z,y)})] + \alpha t. \quad (2)$$

Due to the temperature difference over the cross section design can determine changes strains and deformations, in turn, the thermal stresses.

Thermal stresses in the concrete structures are considered as a factor in the elastic stress-strain state. The element of the linear stress state, the voltage determined by the formula by volume stressed state.

$$\sigma_{\max} = E_b \cdot (t_2 - t_1). \quad (3)$$

or:

$$\sigma_{\max} = \frac{E_b \cdot \alpha (t_2 - t_1)}{1 - C \cdot \mu}. \quad (4)$$

Here  $\mu$  — Poisson's ratio. On the basis of this technique calculated the thermal stress state of the experienced elements of light-weight concrete in extreme and mean cross-sectional plane. The most significant changes in these parameters as expected, occur in the summer, when the outside temperature reaches  $+40 \dots 45^\circ\text{C}$ , and humidity — average annual minimum as shown on Fig. 1.

In general, the three-dimensional picture of the stress-strain state of the concrete element under the influence of natural temperature and humidity of the environment is shown on Fig. 2.

These charts (diagrams) allow visually assess the dynamics of changes in temperature, strain and stress on the cross section of the element in the three-dimensional coordinates.

Thus, even a relatively small temperature difference in the range of  $10^\circ\text{C}$  — section element leads to a substantial alternating strains and stresses. The values of strains and stresses in the edge zones ( $\varepsilon_{bt} = 0.07 \cdot 10^{-3}$ ;  $\sigma_{bt} = 1.68 \text{ MPa}$ ) greater than the average cross-sectional plane ( $\varepsilon_{bt} = 0.05 \cdot 10^{-3}$ ;  $\sigma_{bt} = 1.2 \text{ MPa}$ ). However, the maximum values of strain and stress of the central and edge areas have a gradient along the cross section member.

It should also be noted that the values obtained by the stress experienced demonstrate dependence on the difference (difference) cross section temperature by element, i.e. the greater the temperature difference across the section element, the higher the value of the internal stress. Thus, when a temperature difference in section I–I on  $13^\circ\text{C}$  ( $55^\circ - 42^\circ$ ) stress values in the middle section reaches  $1.68 \text{ MPa}$ , and in section III–III at a differential temperature of  $10-11^\circ\text{C}$  for several lower voltage and represent only  $1.08-1.32 \text{ MPa}$  [3, 106–108].

It is important to note the effect of stress gradient that occurs under conditions of temperature flow. As seen from the stress diagram (Fig. 1) at the same temperature at the surface of the reinforced concrete element ( $55^\circ\text{C}$ ) received voltage values are different from each other. For sections II, II–II and III–III, they are respectively

1.44, 1.20 and 1.68 MPa. A similar effect is observed in other sections. There is an effect due to the difference in temperature at the edge and interior areas sectional element. The greater the temperature difference, the further removed values from the midline. Accordingly, these points more compared to displacement and therefore stresses. Therefore, in the sections I-I and III-III and voltages in the edge zones and inner layers of the reinforced concrete element is higher than the average cross section II-II.

This Thermo-strained state element is precisely the reason for the significant destructive processes as early cracking, education to operational deformations, etc.

**Summary**

Analysis of the stress values shows that they are at a maximum temperature close to that of the tensile strength of concrete in tension. Most importantly, with the passage of time within a day mark maximum stresses during cooling or heating is changed from positive to negative and vice versa. That is, the fibers in the middle part of the concrete section of the element during the day undergoing tensile stress, and then compressing and vice versa, depending on the time of day (morning, evening). Such a voltage drop in the body of the reinforced concrete element takes place during the whole

period of its operation, but with varying intensity depending on the time of year.

Such cyclical growth and reduce the stress on the cross section of the element inevitably leads to residual deformations in the concrete. Thus accumulating residual strains give rise to microfractures. The process of formation of micro-cracks occur in this case the outer surfaces of the structure, as is customary in the classical theory of reinforced concrete, and inside it. With time microcracks formation process reaches the outer layers of concrete, which already leads to the appearance of visible cracks on its surface in spite of calculation according to conventional techniques, according to which the fracture design must be provided.

This contradiction arises precisely because these methods do not take into account the dynamics of the effects of temperature on the concrete and reinforced concrete elements Thermo-stressed state explicitly. The most significant impact is when specified, as shown by our study, is not the presence of high (or low) temperature per se, but the dynamics of the passage of the temperature field in the cross section reinforced concrete element, which leads to destructive processes detected. If in the design process to objectively take into account the working conditions of the design, such events can be avoided [1, 6-7].

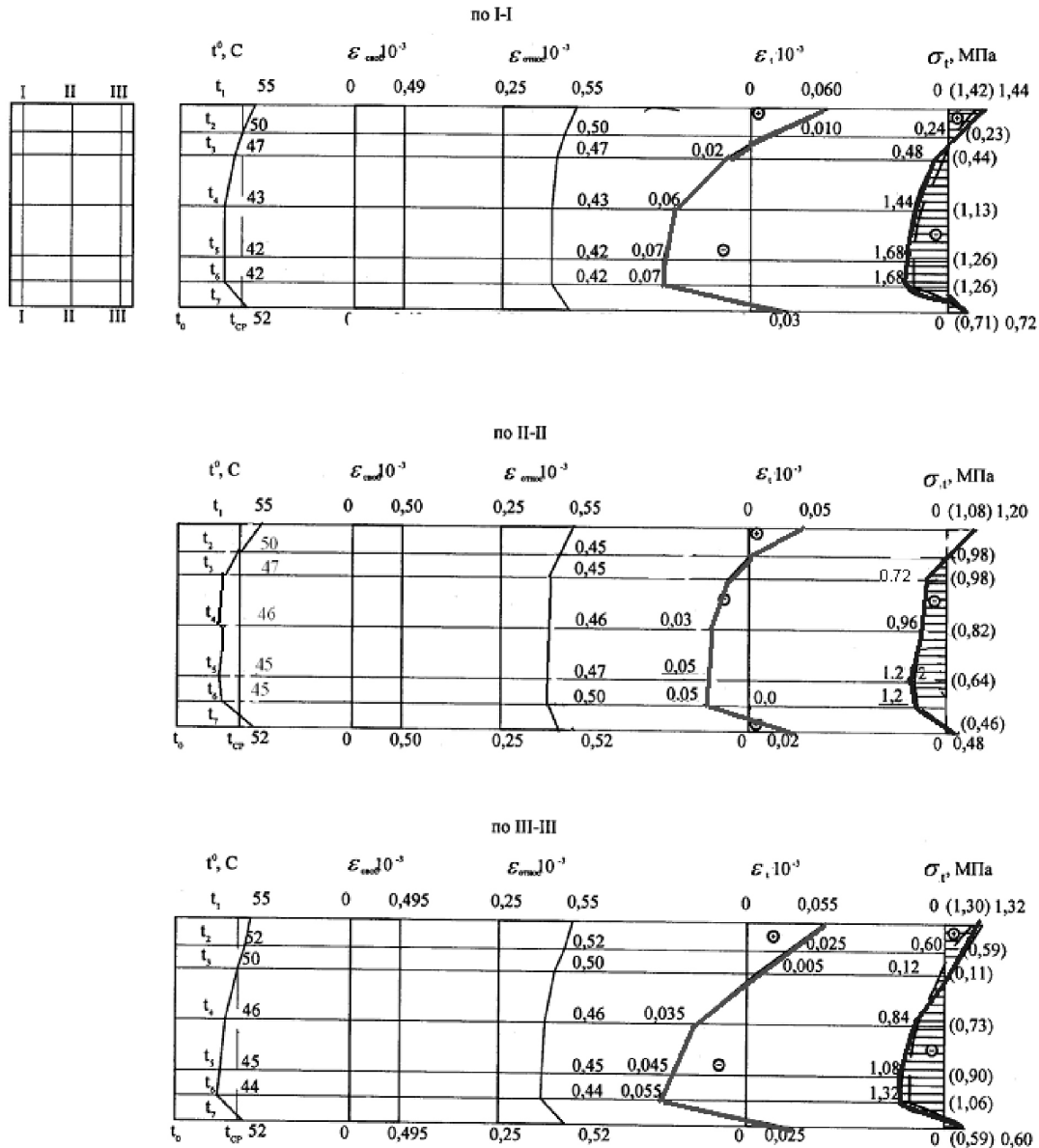


Fig. 1. Changing the temperature of the concrete –  $t, ^\circ\text{C}$  and temperature voltage –  $\sigma_t$  the cross section of the structure (vertical)

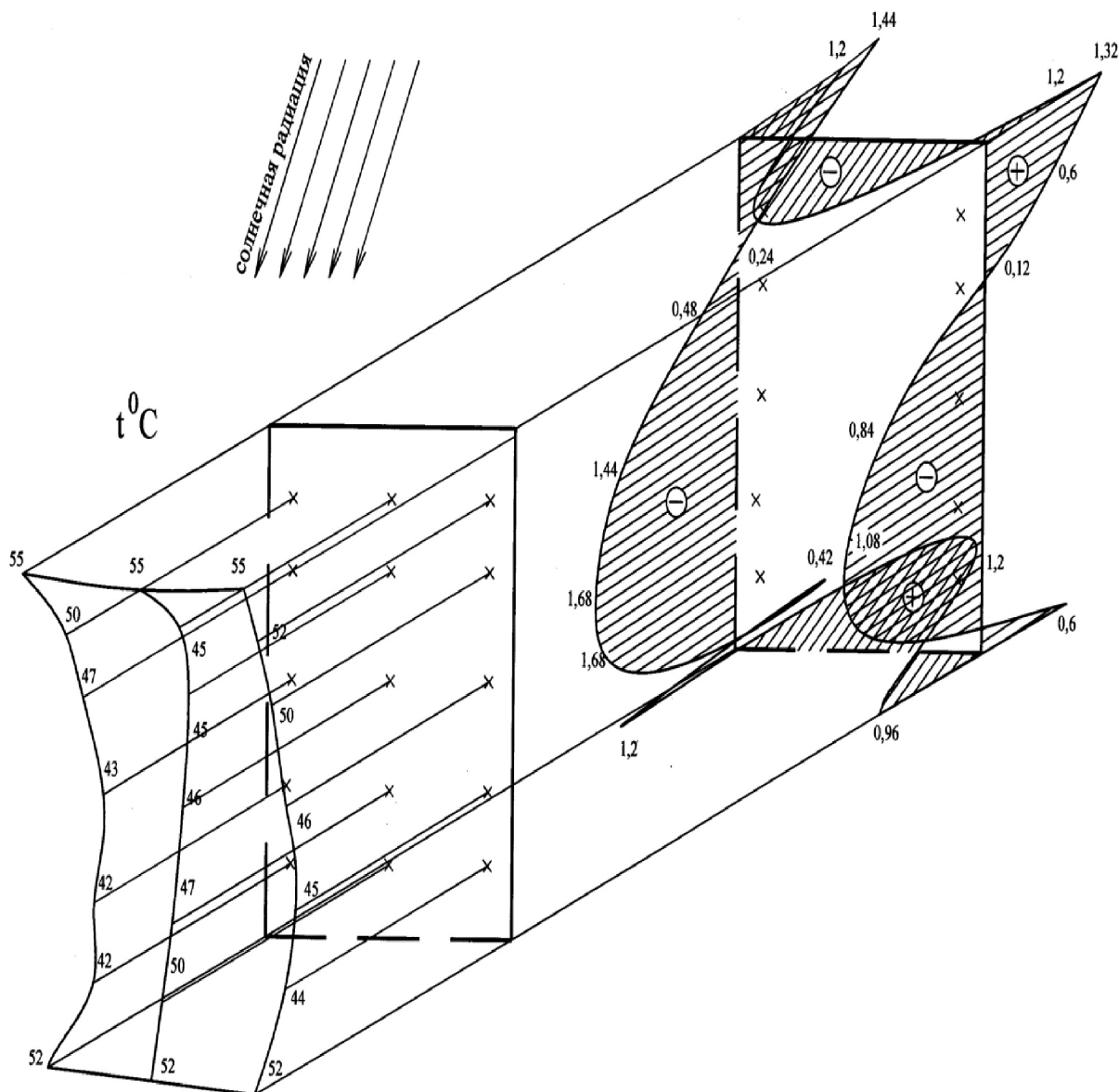


Fig. 2. Changing the temperature of the concrete –  $t, ^\circ\text{C}$  and temperature voltage –  $\sigma_t$  the cross section of the structure (on  $t_{\text{effect}} = 40^\circ\text{C}$  and time  $16^{00}$  hours)

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## Providing with uniform soil covering of the scattered seeds of wheat

**Abstract:** In article the theoretical analysis of possibility of maintenance seal the scattered seeds of wheat is resulted by uniform thickness of the soil received as a result of formation of furrows.

**Keywords:** the open space, the special installation, the new technology, an irrigated flute, crest soils, hiller with wings, a surface, a return proportion.

The essence of offered new technology consists in providing uniform covering with the soil received at formation irrigating furrower, wheat seeds.

It is known, that reception of uniform shoots of seeds depends not only on quality irrigating furrower [1, 181–184], but also on uniformity covering seeds soil. This question is still insufficiently studied [2, 361–390].

For realization of the given problem it is offered to establish working bodies on beam parallelogram the mechanism. In fig. 1 – drawing the scheme parallelogram the mechanism, the working bodies established on it and forces operating on them is presented.

These forces are the following: 1 – parallelogram the mechanism; 2 – basic wheel; 3 – furrower; 4 – adaptation for leveling soil;

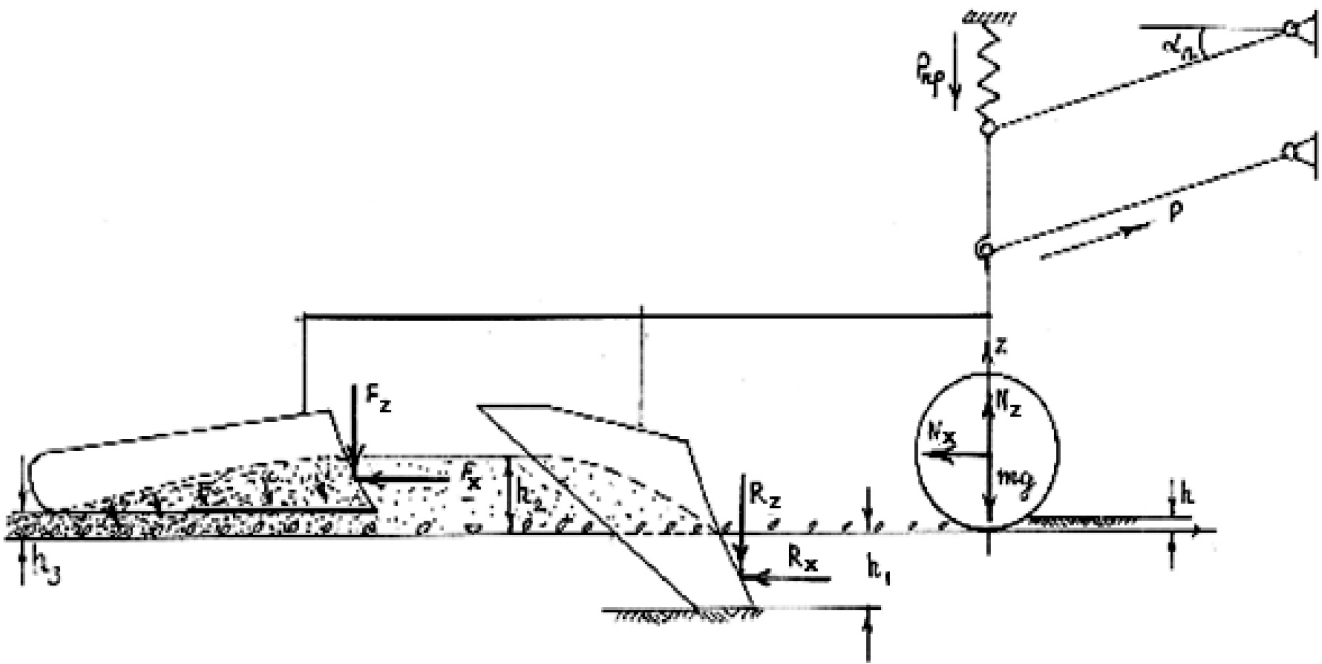


Fig. 1. The scheme for studying of uniform movement furrower and spreader soils

- $P_x, N_z$  — reaction of resistance of soil to rotation of a basic wheel and normal reaction, N;
- $P_{np}$  — initial effort of a spring parallelogram the mechanism, N;
- $m$  — weight parallelogram mechanisms with working bodies, kg;
- $g$  — acceleration of free falling,  $m/s^2$ ;
- $R_z, R_x$  — horizontal and vertical forces operating on furrower, N;
- $F_z, F_x$  — the horizontal and vertical forces operating on spreader of soil, N.

Condition of a static balance, we will write down in a following kind:

$$(R_x^n + F_x^n)tg\alpha_n - (R_z^n + F_z^n) - mg + \Delta_{cm} \cdot C_n B(1 + \mu tg\alpha_n) - P_{np}^0 = 0, (1)$$

where  $R_x^n, F_x^n, R_z^n, F_z^n - R_x(t), F_x(t)$  and  $R_z(t), F_z(t)$ . Average values of forces;

$\Delta_{cm}$  — deformation of soil from action of a basic wheel at static balance of working bodies, m;

$C_n$  — specific elasticity of soil,  $N/m^2$ ;

$In$  — width of a basic wheel, m;

$\mu$  — resistance factor rolling a basic wheel;

$\alpha_n$  — a corner of a longitudinal inclination parallelogram the mechanism.

Fluctuation parallelogram the mechanism at movement is influenced by physic mechanical properties of soil, quality of preparation of a field to crops and other factors. For definition of degree of influence of various factors on depth of occurrence of working bodies in soil and uniformity covering on a thickness it is necessary to work out the movement equation on a longitudinal surface. With the account of that at unit work the certain layer of earth of a furrow

on which seeds are scattered is leveled [1, 181–184], we accept following conditions:

1. The sowing unit moves with invariable speed.
2. We neglect forces of a friction in hinges parallelogram the mechanism in view of their insignificance.
3. Force from weights of working bodies and parallelogram the mechanism are enclosed to the centre of an axis of a basic wheel.
4. Influence of rectilinear and angular fluctuations of a tractor on depth of occurrence of working bodies in soil and a thickness of scattered soil on a furrow surface is not considered.
5. Basic wheels move without a separation from a soil surface, i. e. the condition:  $mg + R_z + F_z > (R_x + F_x) tg\alpha_n$  [3, 114–116] is constantly satisfied.

At performance of these conditions depth of occurrence of working bodies changes depending on change of depth of occurrence of a basic wheel in soil.

Considering the above-stated, oscillatory process of a basic wheel (fig. 1) it is possible to express as follows:

$$m\ddot{Z} = N_z - mg - (R_z + F_z) + (R_x + F_x + P_x) tg\alpha_n - P_{np}. (2)$$

If to accept  $P_x = \mu N_z$ , in that case

$$m\ddot{Z} = N_z - mg - (R_z + F_z) + (R_x + F_x) tg\alpha_n + \mu N_z \cdot tg\alpha_n - P_{np}; (3)$$

or:

$$m\ddot{Z} = N_z(1 + \mu \cdot tg\alpha_n) - mg - (R_z + F_z) + (R_x + F_x) tg\alpha_n - P_{np}, (4)$$

where  $P_{np}$  — effort of a spring parallelogram the mechanism, N.

At static balance the mechanism:

$$P_{np} = P_{np}^0. (5)$$

If to take into consideration that force  $N_z$  is proportional to change of deformation of soil it is possible to write down [1]:

$$N_z = N_y + N_c. (6)$$

At static balance of working body:

$$N_y = \Delta_{cm} C_n B; \quad (7)$$

$$N_c = 0. \quad (8)$$

At lifting of working body (a basic wheel) on height Z:

$$N_y = \Delta_{cm} C_n B - Z C_n B = C_n \cdot B (\Delta_{cm} - Z); \quad (9)$$

$$N_c = \dot{Z} \cdot \epsilon_n \cdot B; \quad (10)$$

or:

$$N_y = N_c = \Delta_{cm} \cdot C_n \cdot B - Z C_n B + \dot{Z} \cdot \epsilon_n \cdot B. \quad (11)$$

And at movement:

$$P_{np} = P_{np}^0 + Z C_n, \quad (12)$$

where  $C_n$  — elasticity of a spring, N/m.

Considering expressions (6) ... (12) we will receive the equation of fluctuation of a basic wheel depending on forces  $R_x, F_x$  and  $R_z, F_z$ :

$$m \ddot{Z} = \left[ (\Delta_{cm} - Z) C_n - \dot{Z} \epsilon_n \right] B (1 + \mu \operatorname{tg} \alpha_n) - mg - (R_z + F_z) + (R_x + F_x) \operatorname{tg} \alpha_n - (P_{np}^0 + Z C_n). \quad (13)$$

Considering, change of forces  $R_x, F_x$  and  $R_z, F_z$  under the harmonious law, we will receive:

$$\begin{aligned} (R_x + F_x)(t) \operatorname{tg} \alpha_n - (R_z + F_z)(t) &= (R_x^n + F_x^n) \operatorname{tg} \alpha_n - \\ - (R_z^n + F_z^n) &+ \sum_{n=1}^{n_1} \left[ (\Delta R_x^n + \Delta F_x^n) \operatorname{tg} \alpha_n - (\Delta R_z^n + \Delta F_z^n) \right] \cdot \cos n\omega t, \end{aligned} \quad (14)$$

where  $R_x^n, F_x^n, R_z^n, F_z^n - R_x(t), F_x(t)$  and  $R_z(t), F_z(t)$  average values of forces;

$$\Delta R_x^n, \Delta F_x^n \text{ and } \Delta R_z^n, \Delta F_z^n - R_x(t), F_x(t) \text{ and } R_z(t), F_z(t)$$

Amplitude of variable making forces;

$$n = 1, 2, 3 \dots n_1 \text{ — numbers of harmonics;}$$

$$\omega = \Delta R_x^n, \Delta F_x^n \text{ and } \Delta R_z^n, \Delta F_z^n - \text{frequency of change of forces, s}^{-1};$$

Substituting corresponding values of sizes in expression (13), we will receive:

$$\begin{aligned} m \ddot{Z} &= \left[ (\Delta_{cm} - Z) C_n - \dot{Z} \epsilon_n \right] B (1 + \mu \operatorname{tg} \alpha_n) - \\ - mg - (R_x^n + F_x^n) \operatorname{tg} \alpha_n - (R_z^n + F_z^n) &+ \\ + \sum_{n=1}^{n_1} \left[ (\Delta R_x^n + \Delta F_x^n) \operatorname{tg} \alpha_n - (\Delta R_z^n + \Delta F_z^n) \right] \cdot \cos n\omega t - (P_{np}^0 + Z C_n). \end{aligned} \quad (15)$$

Considering, that the sum (15) sizes entering into the equation from the equation of static balance (1) is equal to zero, we will receive:

$$\begin{aligned} m \ddot{Z} + B \epsilon_n \dot{Z} (1 + \mu \operatorname{tg} \alpha_n) + (C_n B + C_H) Z \cdot (1 + \mu \operatorname{tg} \alpha_n) &= \\ = \sum_{n=1}^{n_1} \left[ (\Delta R_x^n + \Delta F_x^n) \operatorname{tg} \alpha_n - (\Delta R_z^n + \Delta F_z^n) \right] \cdot \cos n\omega t; \end{aligned} \quad (16)$$

or:

$$\begin{aligned} \ddot{Z} + \frac{\epsilon_n \cdot B \cdot \epsilon}{m} \dot{Z} + \frac{(C_n B + C_n)}{m} \epsilon Z &= \\ = \frac{1}{m} \sum_{n=1}^{n_1} \left[ (\Delta R_x^n + \Delta F_x^n) \operatorname{tg} \alpha_n - (\Delta R_z^n + \Delta F_z^n) \right] \cdot \cos n\omega t, \end{aligned} \quad (17)$$

where  $\epsilon = 1 + \mu \operatorname{tg} \alpha_n$ .

It is considered, that expression (17) is the non-uniform differential equation of the second order. It expresses fluctuations in a vertical plane of a basic wheel, furrower and spreader soils. Its decision is possible in a following kind [4, 648].

$$Z_x = Z^1 + Z^{11}, \quad (18)$$

where  $Z^1$  — the common decision of the left part of the equation, expressing free fluctuation of working body;  $Z^{11}$  — the private decision of the equation expressing compelled fluctuations under the influence of forces  $\Delta R_x^n, \Delta F_x^n$  and  $\Delta R_z^n, \Delta F_z^n$ .

In the presence of force  $\epsilon_n \cdot B \dot{Z} (1 + \mu \operatorname{tg} \alpha_n)$  in the equation, free fluctuations of considered system quickly fade, and then pass in a phase of the compelled fluctuations.

The decision of the right part of the equation characterizing compelled fluctuations of working bodies has the following appearance (19):

$$Z(t) = \frac{1}{m} \sum_{n=1}^{n_1} \frac{\left[ (\Delta R_x^n + \Delta F_x^n) \operatorname{tg} \alpha_n - (\Delta R_z^n + \Delta F_z^n) \right] \cdot \cos(n\omega t - \delta_n)}{\sqrt{\left[ \frac{(C_n B + C_n) \epsilon - (n\omega)^2}{m} \right]^2 + \left( \frac{\epsilon \cdot \epsilon_n \cdot B}{m} \right)^2} \cdot (n \cdot \omega)^2}$$

Here:

$$\delta_n = \frac{\epsilon_n \cdot B \cdot \epsilon (n \cdot \omega)}{(C_n \cdot B + C_n) \epsilon - m(n\omega)^2} \quad (20)$$

The condition for uniform depth and a thickness seal the scattered seeds have the following appearance:

$$A_{max} \leq 0.5 \cdot \Delta h, \quad (21)$$

where  $A_{max}$  — the maximum amplitude of the compelled fluctuations of working bodies;  $\Delta h$  — extremely possible deviation of depth and a thickness seal seeds.

Considering a condition (21) we will receive following expression (22):

$$\frac{1}{m} \sum_{n=1}^{n_1} \frac{\left[ (\Delta R_x^n + \Delta F_x^n) \operatorname{tg} \alpha_n - (\Delta R_z^n + \Delta F_z^n) \right]}{\sqrt{\left[ \frac{(C_n B + C_n) \epsilon - (n\omega)^2}{m} \right]^2 + \left( \frac{\epsilon \cdot \epsilon_n \cdot B}{m} \right)^2} \cdot (n \cdot \omega)^2} \leq 0.5 \cdot \Delta h.$$

This inequality depends basically on elasticity of a spring parallelogram the mechanism.

Accepting  $\Delta h = 1$  the sm. [2, 361–390] and solving an inequality (22) at following values of components is comparable the received result with  $0.5 \Delta h$ :

$C_n = 1700 \text{ N/m}^2; B = 0.12 \text{ m}; \epsilon_n = 51200 \text{ Ns/m}^2; C_H = 2000, 3000, 4000, 5000, 6000 \text{ N/m}; \Delta R_x^n = 300 \text{ N}; \Delta F_x^n = 120 \text{ N}; \Delta R_z^n = 50 \text{ N}; \Delta F_z^n = 30 \text{ N}; m = 81 \text{ kg}; \omega = 2 \text{ s}^{-1}; \alpha_n = 20^\circ; \mu = 0.3; n = 1; \epsilon = 1 + \mu \cdot \operatorname{tg} \alpha_n = 1.11.$

Values  $A_{max}$  depending on elasticity of a spring are presented on fig. 2.

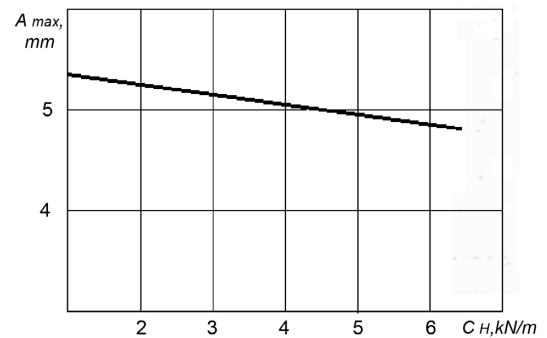


Fig. 2. Dependence of amplitude of compelled fluctuations  $A_{max}$  on elasticity of spring  $C_H$

Apparently, at  $C_H = 5 \text{ kN/m}$  it is had  $A_{max} = 4.8 \text{ mm}$ . Thus, accepting  $\Delta h = 1 \text{ sm}$ . we will receive  $\Delta h > A_{max}$ , (т. с.  $5 > 4.8 \text{ mm}$ ), that correspond to condition  $A_{max} \leq 0.5 \cdot \Delta h$ .

On the basis of the above-stated possible to draw following conclusions: at  $C_n < 5 \text{ kN/m}$  the amplitude of fluctuations exceeds admissible value  $\Delta h$ , and at  $C_n > 5 \text{ kN/m}$  the increases elasticity of a spring and lost its springing properties.

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## **The influence technological parameters on the physical and mechanical properties twisted yarn**

**Abstract:** The article contains results analyzes and experimental study on the techniques and technology of production and torsional mechanical properties developed on different yarn twisting machines. And also, presented a new design of the twisting equipment, which allows you to increase productivity, improve the quality of a multi-twisted yarn with a uniform distribution of twist.

**Keywords:** twist, twisted thread, ring twisting machines, experiment, spinning and twisting machine, spindle, double torsion, range, physical properties, equipment for twists.

Manufacture of textile products based on many years of experience in processing natural fibrous materials. Extensive scientific generalization of the experience to identify the physical nature of the phenomena occurring with fibers, yarns and half-made goods in certain passages of the process, have been producing since 1930.

Therefore, the development of a new range of products, new processes and machines before the optimal solution will be found, we have to spend a large amount of experimental work [1].

The properties of the yarn, thread, fabrics depends on the interaction of many factors and in particular on the geometrical forms of the product and methods of its formation. Studies of the interaction between factors, such as, determining strength parameters thread, it is necessary to examine its structure is limited, mainly the establishment of formulas depending on the strength of the twisted yarn made of natural fibers on the degree of twist and the properties of a single yarn.

Production of twisted yarn — consuming and expensive process, so reducing labor costs and increasing production efficiency — one of the minor problems in the textile industry.

Basically, the experimental work was carried out for chemical staple fibers and natural in Russia and foreign countries to study the structures of yarn and twisted yarn with the influence of the properties of the fibers.

The scientists of the Tashkent Institute of Textile and Light Industry and Namangan Engineering — Institute of Technology are working on research projects for the study and improvement of techniques and technologies textile materials, which leads to an increase in the range and production of fabrics made from twisted yarn.

To study the inherent properties of twisted yarn on separate transitions and comparing process twisted art authors experimental work on a large volume.

Single yarn, usually has an unstable structure and different structure in their physical properties, which negatively affects the quality of her performance. The utilization of fiber in a single yarn strength, determined by the ratio of the relative breaking force relative to the yarn power properties of fiber's, no more than 45–50%. There are various reasons: the presence of weak points in the yarn where the number of fibers in cross section is 1.3–1.4 times smaller than the ratio number of them derived from the linear density yarn and fibers relationship, the fibers have finite length and etc. [2].

For developing, the twisted yarn on ring twisting machines dry method K-83, spinning and twisting machine PK-100-M4 and Two-For-One-Twister machines on firm «Volkman» VTS-08 was used single-stranded cotton yarn of different assortments — 20, 25 and 29 tex.

Firstly was developed twists on structure  $20 \times 2$ , tex  $20 \times 3$  a ring twister machine dry method K-83 from the single-stranded cotton yarn 20 tex and 25 prepared in the spinning «Truetzschler» company equipments. Also, twists of the same structure were produced on Two-For-One-Twister machine VTS-08. For the doubling of threads 2 and 3 in mixing can frame used TV-150. On spinning and twisting machine PK-100-M4 worked out the structure of twisted thread  $20 \times 2$  tex.

Physical and mechanical properties of single yarns and twisted yarns are shown in tables 1 and 2.

Table 1. – Physical and mechanical properties of single yarn

Nº	Indicators number	20 tex	25 tex
1	Numeric value of yarn, $N_m$	50/1	40/1
2	Yarn unevenness, U %	11.3	10.8
3	The coefficient of variation in the unevenness, CV %	10.1	12.78
4	Relative breaking load, cN/tex	10.65	12.01
5	The coefficient of variation in the unevenness, CV %	6.46	7.69
6	Elongation, %	6.01	6.72
7	Neps (1000 m)	94	108
8	The number of twists, Tw/m	924	778
9	The twist coefficient, $\alpha_t$	41.32	42.61

Table 2. – Physical and mechanical properties of twisted yarns

Nº	Indicators number	Type of twisting machines							
		K-83	PK-100	VTS-08	K-83	VTS-08	K-83	PK-100	
1	Linear density, tex	41.2	41.5	41.2	60.3	60.2	52.7	50.4	
2	Structure of the thread	20×2	20×2	20×2	20×3	20×3	25×2	25×2	
3	Breaking force, cN	571	552	550	782	820	664	521	
4	Relative breaking load, cN/tex	13.8	13.2	12.36	11.29	13.62	12.2	10.2	
5	The coefficient of variation of the relative breaking load, CV%	4.86	9.27	4.75	4.65	4.65	18.3	13.2	
6	Elongation, %	5.8	6.65	4.88	5.9	4.33	8.6	7.6	
7	Number of Twists, Tw/m	550	568	550	423	450	584	575	
8	The twist coefficient, $\alpha_t$	38.4	44.1	34.7	39	34.8	42.4	45.1	

The rule structure twisted yarns of different structures are general and specific characters. To ensure that these similarities have to apply different design major working bodies. If you zoom in private and to establish working bodies can bring them closer to the “universality”, so on the same machine (device) increases production range of yarn.

In the experiments, we were also examined technological capabilities and product lines twisting machines: K-83, PK-100-M4 and VTS-08. From Table 2 can be seen that the same number of torsion and including adding yarn elaborated on the machine K-83 on many physical and mechanical properties superior to other machines. However, due to the low productivity of these machines currently in production they are not used. Spinning and twisting machine such as PC-100 is intended to provide only a twisted yarn in two additions.

The modern development of engineering and technology is characterized by the sharp complexity of the problems solved in the manufacture of products, high requirements for reliability, deadlines

creation and introduction into service, the desire to reduce the cost of product development while meeting the set conditions.

Through the application of double-twist spindles (Two for one) increases the efficiency of torsion process. Product twisted yarn speed is 1200 m/min.

At the exhibitions ITMA presented can frame-twisting machines of the world manufacturers of this type of equipment: ICBT-Verdol (France), Murata (Japan), Saurer Alma (Germany), Savio (Italy) and Volkmann (Germany).

Currently, the textile enterprises are mainly twisted yarn produced on Two-For-One-Twister machines «Volkmann» company VTS, model TDS company «Savio» machines and double torsion brand DX 321D firm «DONG XING» (China).

Further experimental work continued on the machine Two-For-One-Twister VTS-08 of the company «Volkmann». The training and production laboratory of the department “Technology of silk and spinning» (TITLI), yarns 20 tex 2, 3, 6 and 9 additions to the doubling machine “FADIS” (Italy).

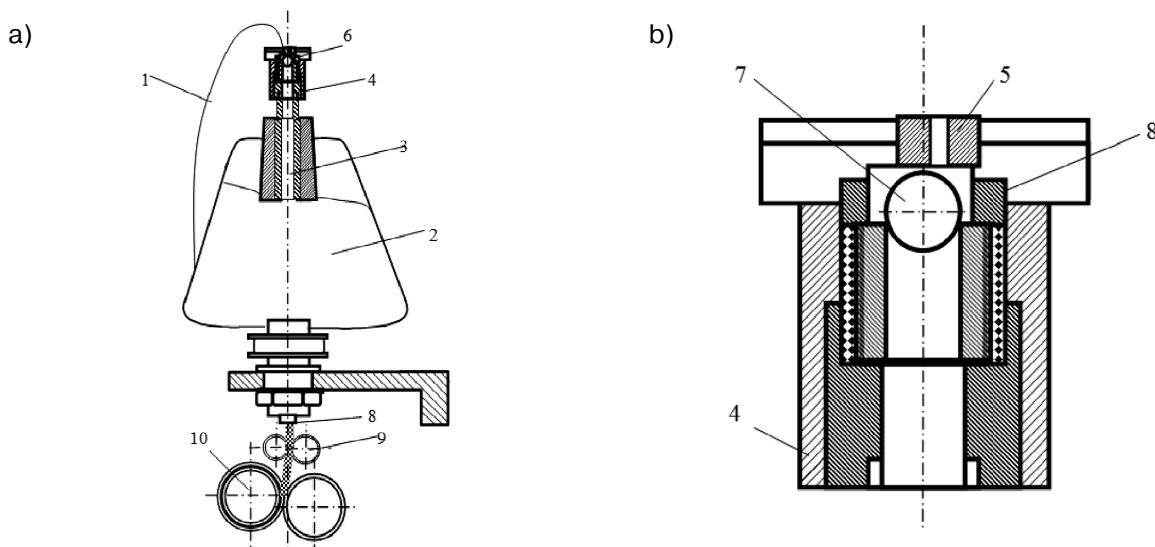


Fig. 1. General view of the new torsion device yarn (a) and the hollow spindle head, a cross-section (b)

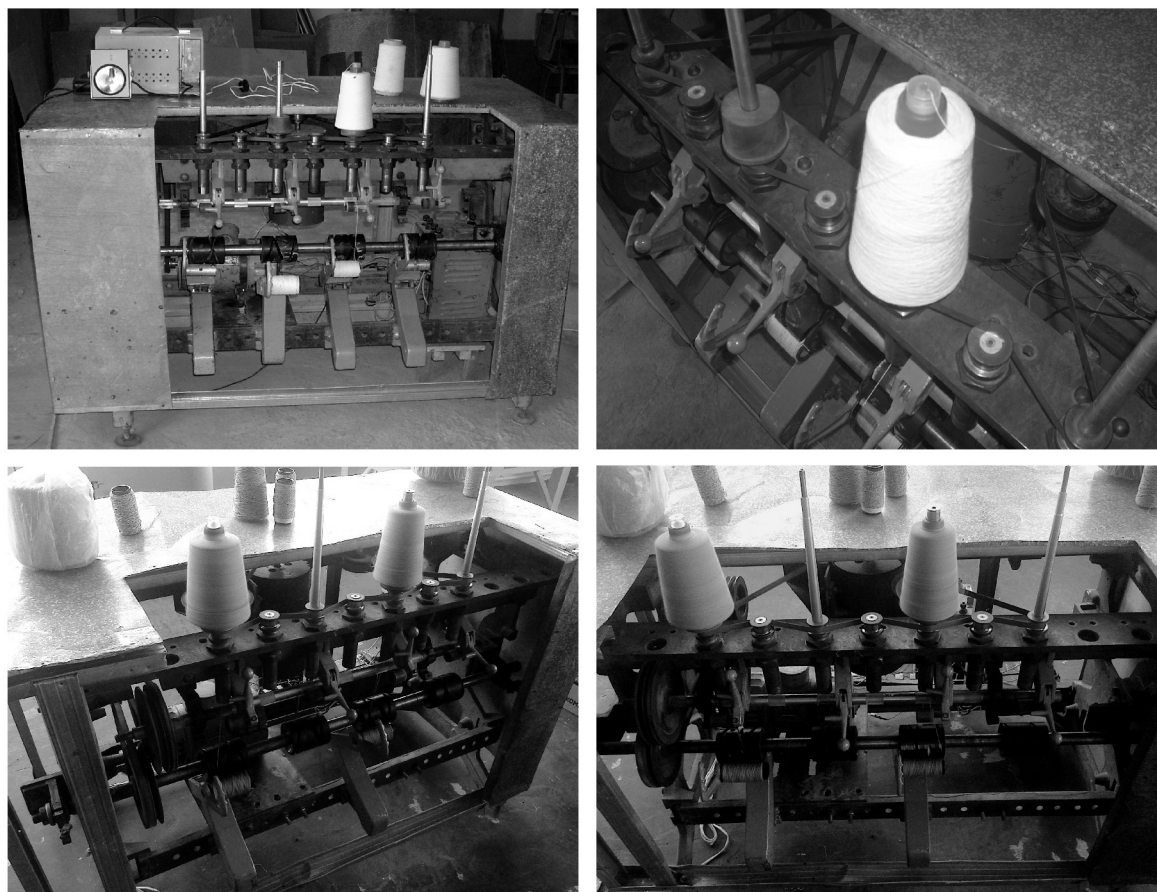


Fig. 2. Laboratory stand new thread mixing equipment

By machine VTS-08 experimental twists  $20 \times 2$  and  $20 \times 3$  developed with different types of torsion 450, 550, 650, 750 and 850 tw/meter twisted  $20 \times 6$  and  $20 \times 9$  thread with the number of torsion 164, 200, 250, 300 and 350 tw/meter [3; 4]. The physical and mechanical properties of twisted yarns, technical and technological, as well as the assortment opportunities VTS Two-For-One-Twister machine. Studies have shown that in spite of high performance cars double torsion, there is a lack of restriction produced assortments [3].

In order to increase the range of textile materials and the requirements for the twisted yarn, the authors developed a new device that allows you to develop a twisted yarn on the spindle [5]. The new device allows to produce twists in 2–32 additions with cabled way.

The principle of operation of the device (Fig. 1) is that doubling the yarn with one reeling spools 2 rotating, impaled on the hollow spindle 3, forming a cylinder 4 is supplied to the nozzle, in the upper part of the inserted spindle. The nozzle 5 consists of a sleeve with an eccentric bore 6 which is inserted into the cavity of the ball 7, which is in spring-loaded nest yarn output tube 8, through which the

retention combining yarn occurs. Yarn Twisting occurs at the site of the ball clip-exhaust steam 9, during the rotation of the spindle with the impaled on his head. Coming out of the tube 8, yarn twisting received arrives at the outlet pair 9 and is wound onto a cylindrical spool 10.

Obtained state grant on the theme “Creating a multi-structural twisted yarn technology” on the basis of conducted research. As a result of this work the authors have developed a new laboratory bench torsion device yarn, which will develop a multi-structured spun yarn (Fig. 2).

In order to optimize technological and kinematic indicators, carried out theoretical research of a new machine produces multi-structural twisted yarn using a mathematical program — MA-PLÉ-9.5 [6; 7; 8; 9].

On the basis of the research conclusion, the new equipment allows the production of twisted yarn of the new structure, to increase the range of twisted products meet the requirements to the twisted yarn.

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## Formation mechanisms of fluorine-containing wear inhibitors of metal-polymer systems

**Abstract:** In this paper the formation mechanisms of separation layers formed by wear products of metal-polymer tribological systems components are given. It is shown that these formation mechanisms determine work and kinetics of separation layers frictional interaction. Using the barrier model was justified the formation of “charge mosaic” on counter-surface of tribological system. This mosaic leads to the formation of local transfer areas followed by their transforming into a stable separation layer that defines mechanisms of friction and wear.

**Keywords:** friction surface, tribosystem, barrier model, energy state, charge mosaic.

### Introduction

According of low wear tribological system concept created by [1; 2], leading role belongs to wear inhibitors — components introduced into the tribological system from outside or formed as a result of tribochemical reactions promoted a suppression of adverse conversion cycle which intensifies processes of wear. In any kinds of contact interaction in different composition and a design tribological systems are formed layers that act as anti-wear component. One of the most important task of tribological engineering is support of such layers formation conditions with parameters necessary and sufficient for the stable maintenance of friction unit during specified life. The solution of this problem is based on system analysis of features of the tribochemical transformations of the tribological system components in certain operating conditions, detection of prevalent contact reactions cycles determined wear and selection of effective methods of control them via constructive, technological, material science solutions [1–6].

The choice of a particular type of wear inhibitor determined the compatibility of friction pair components [1], therefore the most optimal servicing mode of the friction pair [7], involves analysis of various types of operating conditions realization for specified servicing modes [1–10].

In this regard, the investigation of influence of the tribological system components energy state on the mechanism and kinetics of the formation of separation layers in the area of bearing and shaft frictional contact has a significant scientific and practical interest.

The structure and stability of these separation layers define parameters of tribological characteristics of friction pair.

### Results and discussion

It is known that frictional interaction of metal-polymer tribological system components — shaft and bearing — is accompanied by wear particles transfer phenomena and formation of the separation layer whose composition and structure depend on using materials and operating conditions of the friction unit. Using the directional control of physical and chemical processes in the contact area, it is possible to create conditions for the prevailing formation of products that will reduce friction and increase wear resistance of the friction unit, or in other words, will perform function of the component reduced the wear rate — wear inhibitor [1].

The thin films of fluorine-containing components of different molecular weight, structure and production technique are rated among the effective wear inhibitors of «metal-metal» and «metal-polymer» systems. It has been found that irrespective of structure and mass, films of fluorine-containing oligomers coated from solutions [8], formed from the active gas phase [9], rotaprint thin films from products of thermogas dynamic synthesis (TGD-synthesis) of polytetrafluoroethylene [10], transfer thin films of the wear products of polytetrafluoroethylene and composites are effectively reduce wear of tribological systems operated without external supply of lubricant or lubricated by oils and plastic compositions based on oil and synthetic products.

In spite of this type of wear inhibitors formation technologies differences, probably, there are general prerequisites for the

realization of their beneficial effect on tribological processes due to structural features of thin films on solid substrates of various composition. It is seen that significant role in structural and phase transformations of thin-film fluorine-containing wear inhibitors are played energy characteristics of the metallic counter-surface that is represents a complex heterogeneous system.

An obvious consequence of the heterogeneous structure of the metal components is nonequilibrium of charges transfer processes between the individual areas of the surface layer and the interface of static and dynamic metal-polymer systems components that have a significant impact on contact processes, especially on the mechanism and kinetics of mechanochemical wear [11].

In connection with this, significant interest is an analysis of metal components structure features in terms of the charge state of the metal substrate surface layer.

Hamiltonian of independent electron model (adiabatic approximation) in the Schrodinger equation, is given by Eq. (1):

$$\hat{H} = -\frac{\hbar^2}{2m} \Delta + u(\vec{r}), \quad (1)$$

where  $\hbar$  is the Planck constant,  $m$  is the electron rest mass,  $u(\vec{r})$  is the potential function.

If the Hamiltonian (1) is used to describe the state of an electron in the crystal, that is in the field of periodic potential, that  $u(\vec{r})$  has view as Eq. (2)

$$u(\vec{r}) = u(\vec{r} + \vec{R}), \quad (2)$$

where  $\vec{R}$  is a translation vector which equal Eq. (3)

$$\vec{R} = m\vec{a} + n\vec{b} + p\vec{c}, \quad (3)$$

where  $\vec{a}$ ,  $\vec{b}$ ,  $\vec{c}$  are the Bravais lattice,  $m$ ,  $n$ ,  $p$  are integers.

A solution to the Schrodinger equation for adiabatic approximation with a periodic potential is the wavefunctions, defined by the Bloch Theorem stated in is given by Eq. (4):

$$\psi_{nk}(\vec{r}) = \phi_{nk}(\vec{r}) \cdot \exp i\vec{k}\vec{r}, \quad (4)$$

where the wave vector  $\vec{k} = 2\pi\vec{s}$ ,  $\vec{s}$  is the reciprocal lattice vector. The function  $\phi_{nk}(\vec{r})$  has the property of periodicity. According to this we have Eq. (5)

$$\phi_{nk}(\vec{r} + \vec{R}) = \phi_{nk}(\vec{r}). \quad (5)$$

Inserting solutions of the form given in Eq. (1-5), we get Eq. (6):

$$\begin{aligned} \psi_{nk}(\vec{r} + \vec{R}) &= \phi_{nk}(\vec{r} + \vec{R}) \cdot \exp i\vec{k}(\vec{r} + \vec{R}) = \\ &= \phi_{nk}(\vec{r}) \exp i\vec{k}\vec{r} \cdot \exp i\vec{k}\vec{R} = \psi_{nk}(\vec{r}) \cdot \exp i\vec{k}\vec{R}. \end{aligned} \quad (6)$$

The received Eq. (7):

$$\psi_{nk}(\vec{r} + \vec{R}) = e^{i\vec{k}\vec{R}} \cdot \psi_{nk}(\vec{r}), \quad (7)$$

is another form of the Bloch theorem [12].

One can see from the Eq. 7 that the wave function of an electron in a periodic potential field ( $u(\vec{r})$ ) corresponds to the solution of the Schrodinger equation for a free electron ( $\psi(\vec{r})_f$ ):

$$[\psi_k(\vec{r})]_f = \psi_0 \exp(i\vec{k}\vec{r}), \quad (8)$$

but instead of a constant amplitude factor  $\psi_0$  in the equation 7 is the wave function with period  $R$ . The wave number ( $k$ ) is called the zone number. For a fixed ( $k$ ) there are many independent own states with their specific energy values, which are distributed to zones, separated by energy values that are not eigenvalues of the Hamiltonian, that is prohibited for electronic states.

In attempting to describe the state of an electron near the surface of the crystal it should be appreciated that in these areas of the substance is breached the periodicity of potential and on the surface of crystal is created the so-called surface barrier, whose shape depends on many factors, beginning with defects of different nature (by the way, the surface itself is two-dimensional defect), also with the surface layers morphology. The function of the surface potential ( $u_s$ ) changes its shape in passing from one point of the surface to another, that is:

$$u_s = u(\vec{Q}), \quad (9)$$

where  $\vec{Q}$  is the position vector of a point on the surface.

In work [12] is shown that under the breach of periodicity of potential near the surface the wave function takes the form different from those given by equations 5 and 9.

Note that the function  $\psi$  falls off exponentially outside of metal and has an exponentially decreasing envelope inside. In this case, along with real wave vectors  $\vec{k}$  inside the crystal there are other solutions with the complex wave vectors that correspond to states of electrons localized near the crystal surface different from the bulk. These surface states with specific energy levels have been considered for the first time by I. Y. Tamm and bear his name — Tamm levels.

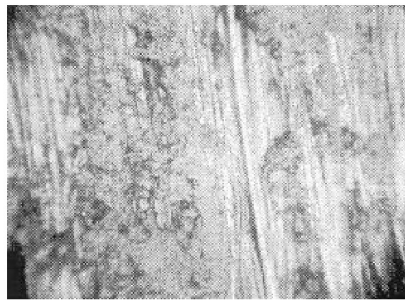
In discussing of the crystal bulk properties the influence of these surfaces layers are neglected, because that the ratio of the surface levels number to Bloch levels not exceeding ratio of the surface atoms number to the total atoms number in a crystal, which for the macroscopic prototype does not exceed  $10^{-8}$ .

As a result, surface levels give disparagingly small contribution to the bulk properties; the exception are nano-objects whose surface and dimensional factors play an important and often main role. However, in single crystal the Tamm levels are also very important for the determining of crystal surface structure. For example, they should be considered in any microscopic calculation of the surface layer structure [12].

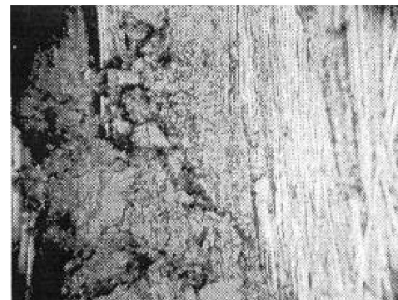
The frictional interaction of the components metal-polymer tribological system causes the formation on contact surfaces the layer with specific morphology (Fig. 1). The fixation of wear particles of the model sample manufactured by compression of graphite particles with a size of 1–5 micrometer is a result of the energy (charge) and morphology (size) factors cumulative effect. This is evidenced by the specific structure of the transferred layer, whose area depends on the number of cycles of frictional interaction tribological system components (Fig. 1, b-f).



a)



b)



c)

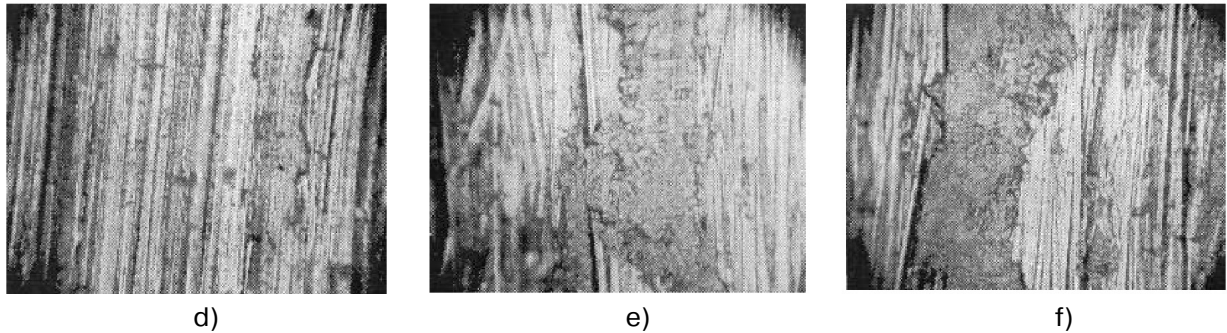


Fig. 1. The morphology of the surface layer of the sample made of steel 45 after frictional interaction with a graphite sample: a) – the original; b) – after 10 cycles; c) – after 20 cycles; d) – after 30 cycles; e) – after 40 cycles; f) – after 50 cycles

The unstable character of the formation process of the separation layer leads to breakdown in process of stable operation of a particular friction unit that may lead to its failure in the presence of regime excursions caused by a combination of factors — physical, organizational, qualifications, etc.

An effective way to increase parameters of the service life and reliability of tribological systems is the using of special methods to increase of the spacer layers stability via selection of components for composition, preparation technology of friction union surfaces, directional control of mechanisms and kinetics of favorable cycles of tribochemical reactions [1; 2]. It is obvious that in choosing these methods is very important to take account of energetic features of materials formed wear inhibitors, which are due to their composition, crystal-chemical structure, defectiveness and others factors.

The effective wear inhibitors of metal-polymer tribological systems are thin-film coatings formed by solution and vacuum technologies. It is known that coating the friction surface by thin films of fluorinated oligomers such as “Epilam”, “Foleoks” [8] and the formation of films by nitrides and carbides of titanium (TiN, TiC, TiCN, etc.) provides increase of various design friction couples wear resistance.

Multivariate mechanism of inhibitory action of these thin films is also determined by the energy state of the metal substrate on which they are formed.

The action mechanism of fluorine-containing high-molecular components thin-film coatings with using of various techniques (solution, rotaprint, vacuum, mechanochemical) has plenty going for the common control methods of energy and morphological parameters of metal-polymer system elements, because it provides highly efficient of inhibitory effect on the wear process, does not require using of special machine-tool attachments (sand wheel blasting, phosphatization, etc.) and can be used in precision friction units.

The presence of fluorine-containing high-molecular compounds sublayer helps to reduce the running-in time of friction unit and to the formation of separation (transferred) layer with a specific surface area  $W = 0.85-0.95$  of the total area of friction surface (Fig. 2).

Thus, taking the energy and morphological factors into account for choosing of the composition and components application technology, which provide the inhibitor effect of the metal-polymer tribological system wear process, determines attainment of the service life and reliability high parameters.

#### Conclusion

Energy state of the surface layer of the metal-polymer tribological system metal component characterized by the presence of a charge mosaic determines necessity for the using of special components for the formation of the separation layer with high stability. As components for the formation of wear inhibitors are effective the fluorine-containing polymer and oligomer compounds coated by solution, rotaprint or vacuum techniques.

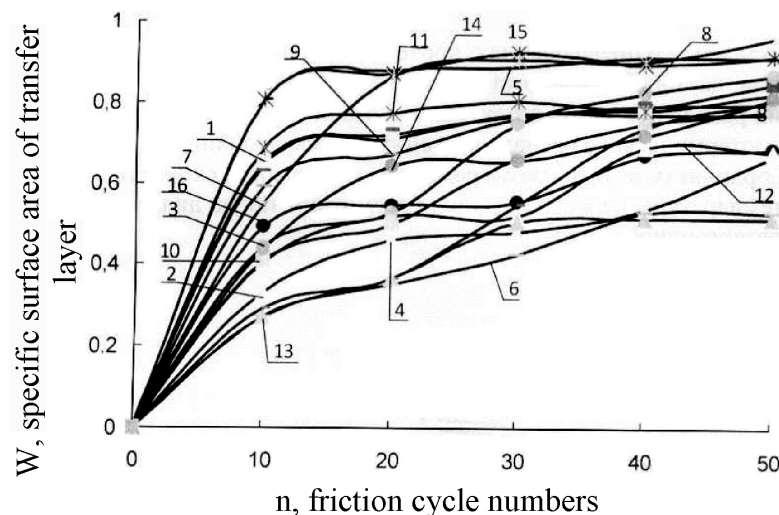


Fig. 2. The kinetics of mass transfer for friction process of the carbon sample with various surface pre-treatment counterbody: 1 — TiN + F-1; 2 — phosphate layer (5 min) + F-14; 3 — phosphate layer (15 min) + F-1; 4 — TiN + F-14; 5 — TiN (dropping phase) + F-1; 6 — phosphate layer (15 min) + F-14; 7 — steel 45 + sandblasting + F-1; 8 — steel 45 + sandblasting + F-14; 9 — TiN (dropping phase) + F-14; 10 — phosphate layer (30 min) + F-14; 11 — phosphate layer (30 min) + F-1; 12 — steel 45 + F-14; 13 — steel 45 + F-1; 14 — phosphate layer (5 min) + F-1 + F-14; 15 — phosphate layer (5 min) + F-1; 16 — TiN + F-1 + F-14

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## Section 11. Physics

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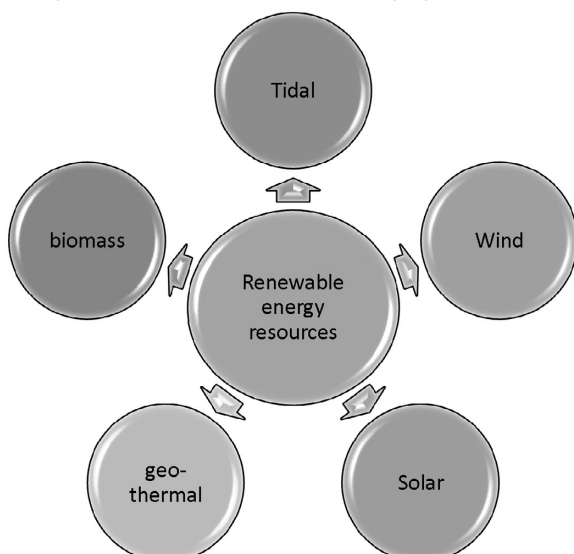
### Renewable energy and environment – a future perspective

**Abstract:** Today's adolescent students are part of the population heading towards the energy crisis. An awareness about alternate energy resources especially renewable energy resources is required among today's youngsters. If the younger generation is part of today's innovation programs in the field of renewable energy, their future advancement in this field will be high and their progress will be in a rapid pace. Thus the inevitable energy crisis awaiting us can be avoided. Along with that, the problem of environmental safety and pollution free energy production can be ensured.

**Keywords:** Renewable energy, environment, adolescent children.

#### Introduction

New alternative energy resources are on high demand worldwide as fossil fuels are depleting at a fast rate. Use of energy resources needs careful handling without damaging the environment. Energy efficiency and conservation of energy are the two areas that we have to concentrate as these two are the deciding factors for the benefit of society. As our demand for energy is increasing due to the increasing living standards people are in need of more energy supply and are exploring more and more options for energy. Renewable energy resource is the only option for overcoming the energy demand. This includes solar, wind, biomass, tidal, ocean and geothermal energies. These resources are highly recommended for the future as this can be replenished and will last for millions of years. The environmental aspects are to be considered while harnessing this energy as this should be without damaging the environment.



#### Research problem

The world is heading towards energy crisis. How the adolescent students are approaching this issue, are they aware of the importance of renewable energy resources, are they aware of the negative impact of usage of nonrenewable energy resources in the surrounding environment and how to overcome their negative impacts by the usage of renewable energy resources are the key points focused in this study.

#### Key issues

The population is one of the major factors which decides the demand for fossil fuels. Along with this, the increase in the standard of living and the increased use of transportation and industries increases the demand for energy. These demands are met by the fossil fuels now. The major issue coming due to the use of this fuel is emission of greenhouse gases and subsequent pollution caused to the environment. This indirectly affecting the average temperature of the earth. It is found that the emission of these gases increases the average atmospheric temperature which indirectly causes the melting of ice in polar regions. This causes the increase in sea levels, and conditions like heat waves, droughts, and changing weather conditions. Global warming is one key issue due to the emission of the gaseous product, carbon dioxide. How much the young generation is aware of the importance of protection of environment? Are they aware of the importance of the nonrenewable energy resource and their role in protection of environment? These are some of the key issues discussed in this study.

#### Solar energy

This is renewable energy which is practically inexpensive. But this is a weather dependent energy. The storage of this energy is expensive and needs lots of space for harnessing the energy.

#### Wind energy

This is a clean source which does not cause atmospheric pollution. This is a sustainable source of energy which exists everywhere in the universe. This is created by the rotation and revolution

of earth and this depends on the heating on earth. This is energy harnessing is hard as the availability of the land is at remote locations and the installation cost is high. The environmental impact is less in the form of pollution but can create a noise pollution.

#### **Tidal energy**

The gravity of moon plays a major role in creating tides on earth. The continuous movement of tides can be used to produce electrical energy. This is an inexhaustible form of energy which depends on the cyclic pattern of tidal movements. The efficiency of this power is high compared to solar or wind energy. But this energy generation has certain disadvantages also as it may cause disturbance to aquatic life and its migration at least in the construction time.

#### **Geothermal energy**

The heat energy that we are getting from earth can be used to produce energy. We are tapping the energy of the hot rocks which are present in the interior of the earth. The areas hot areas inside the earth where these hot regions are present are the areas known as hot spots. These areas are normally the areas where we can see these hot springs. Through the installation of power plants, we are tapping geothermal energy. However, this is feasible in some areas where hot spots are present. This can cause a disturbance to the earth since we are digging the earth to lay pipes and this, in turn, can create seismic waves. This energy is independent of weather conditions but can cause environmental hazards. There is always a danger of the eruption of the volcano in these sites. It may release harmful poisonous gases through the drilled holes and can create atmospheric pollution.

#### **Biomass**

This energy is contained in plants and animals. This is not creating environmental threat by any type of harmful emission. This is a clean energy carbon dioxide emission is negligible in its production. Since the source of energy is living source the sources are never run out as the waste products are present abundantly on earth. But in some facts this is at least, harmful to the environment. The one of the products that we are obtaining from biomass is biogas which is not environment-friendly.

#### **Tidal energy**

The gravity of moon plays a major role in creating tides on earth. The continuous movement of tides can be used to produce electrical energy. This is an inexhaustible form of energy which depends on the cyclic pattern of tidal movements. The efficiency of this power is high compared to solar or wind energy. But this energy generation has certain disadvantages also as it may cause disturbance to aquatic life and its migration at least in the construction time.

#### **Review of literature**

All energy sources share the feature of being distributed over the territory and of being measurable only at specific sites [1]. Renewable energy resources and their utilization are intimately related to sustainable development [2]. A review of the current state of the art in computational optimization methods applied to renewable and sustainable energy, offering a clear vision of the latest research advances in this field [3]. A thorough literature survey of major renewable energy gadgets for domestic and industrial applications such as solar water heaters, solar cookers, dryers, wind energy, biogas technology, biomass gasifiers, improved cook stoves and biodiesel was made in to improve its scope [4]. Reports by experts on a of renewable technologies is development and widespread use of renewable energy technologies that can lead ultimately to a world that meets critical socioeconomic, developmental and environmental advancements [5].

#### **Method**

The method used is the analytical survey. This survey was conducted among the adolescent students of age group 13–16 years of

age group. The data was selected based on stratified random technique method. This study was conducted in the secondary and higher secondary students of the Asian region. The major strata's considered were rural an urban population. The sample size was 11 750.

#### **Sample and data collection**

The sample selected was adolescent students of age group 13 to 16 years. Different methods of data collection was implemented in data collection procedure. The data collection were done using telephonic interviewing, using mail surveys, emailing and face to face contact sessions. The major and most important method was face to face sessions.

#### **Tools used for the study**

The main tool used for the study was the survey questioners in different energy resources. This study was conducted to understand the awareness of adolescent students about the environmental protection aspects of renewable energy resources. The questionnaire was prepared was mainly focusing this aspect. These questioners were prepared based on expert's opinion. This questionnaire consists of different sections. The section with questions related to general awareness was primarily dealing with environmental impacts and issues. The section which was focusing specific questions about renewable energy was related to the efficiency and the technologies involved in renewable energy resources and the depth of knowledge students have in this section. The last section was focusing on the level of support young people are willing to extent in implementing these technologies in their day to day life so as to protect the environment. Answers were taken in a 5 point scale. Incomplete answer scripts were rejected and thus, there was a reduction in answer scripts to 11 336. The percentage calculation was done to estimate the awareness in each energy resource. This was tabulated and interpreted.

#### **Mathematical methods**

The data collected was consolidated, the incomplete answer scripts were rejected and the remaining sample size was 11 336. The data collected was quantitatively studied using the percentage calculation with respect to the sample size.

#### **Result**

The results of this survey can be interpreted by taking the percentages of each response with respect to the total sample (table 1).

#### **Analysis**

In general, the result shows the lack of awareness of importance renewable energy resource and its uses and advantage. The percentage calculation in each renewable energy resource was done in a 5 point scale. The percentage calculation was done with respect to the total sample. The results show a general trend of lack of awareness of advantages of renewable energy resources. Adolescent pupil is less aware of the role the renewable energy is having in environmental protection. For both positive and negative statements the responses were showing the same trend. It was evident that there are energy resources which are less familiar to the common people. The use of nonrenewable energy resources was promoted by majority due to the immediate production of energy and the initial cost factors. This is clearly ignoring the environmental factors.

#### **Recommendations and conclusion**

This study is significant as it focuses adolescent folk who decides the future energy requirements and consumption. If adolescent students of today are aware of the environmental impact of non-renewable energy consumption they will be careful about this aspect and will give more attention to the development of alternative energy resource and implantation of ideas which will protect the environment and will make it pollution free. This study reveals that

at present students have little awareness of the advantage of using renewable energy resources and its advantages over non-renewable resources. As the designing of energy efficient projects and their implementation is a requirement for the future, more awareness at this level is required. More advertisements highlighting the advantages of the use of renewable energy resources is required. Invoking public

awareness is one of the factors which decides the success rate of use of renewable energy projects. Designing of buildings which are completely depending on renewable energy resources of energy such as solar energy and designing of gadgets and vehicles on the same concept will decide the future of the earth. Contributions of different organizations are highly valuable in this regard.

Table 1.

Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree	Total
Renewable energy resource like solar energy is better energy resource in as it causes less environmental pollution.	14 %	16 %	22 %	28 %	20 %	11 336
Solar water heaters are us less expensive in long run compared to normal water heaters.	6 %	8 %	12 %	30 %	44 %	11 336
The wind that gives us more comfort is equally capable of producing electrical energy.	8 %	10 %	8 %	28 %	46 %	11 336
From earth we are receiving energy and this can be used to make electrical energy.	6 %	6 %	30 %	40 %	18 %	11 336
Tides can be used to generate electricity.	10 %	14 %	30 %	22 %	24 %	11 336
Solar energy sources are most important to Earth's energy future.	12 %	20 %	34 %	18 %	16 %	11 336
I never consider the environmental Impact of items/projects that are using Nonrenewable sources of energy when making purchasing decisions?	36 %	20 %	18 %	8 %	18 %	11 336
Natural gas and nuclear power are better for the protection of environment compared of biogas.	28 %	26 %	10 %	16 %	20 %	11 336
I would prefer normal cooker than solar cooker they are easy to use.	40 %	30 %	16 %	8 %	6 %	11 336

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## Section 12. Philology and linguistics

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### The importance of name in compositions of the lyrical works

**Abstract:** The article deals with some problems of poetics, i. e. term (names) of verse. Any kind of bearing of poetry serves to reflect one's emotional status out of mental state of the creator. Theoretical conclusions were made on a basis of analysis of lyric works created by karakalpak poets in 1980–2010.

**Keywords:** poetics entitlement, lyrical composition, free verses.

Contemporary Karakalpak literary criticism achieved considerable success during the independent years of our country. In this direction the works devoted to studying theoretical problems of Karakalpak poetry are of great importance. In any works of art its compositional structure forms one of the main components of the text composition of literary works is of great importance in determination of its genre and stylistic peculiarities. Literary critics (scholars) take the artistic wholeness for scientific identification of research subject. Therefore, the composition of any literary works appeals for ensure its artistic wholeness. The choice of this or that compositional structure by the artist for its work makes possible to say about the peculiarities of the work or level of his poetical talents (gifts).

Naturally lyric works are different from other genres with their peculiar structures. In compositional structure of lyric works mainly their semiotic centres as naming of the work, key words and expressions, lyrical degression, stylistic figures and soon are stroked the eye. Consequently to study poetics, composition of lyrical works opens the great possibilities to define the true perception and deep understanding their conceptions, contents, author's method and style as well. Any kind of bearing of poetry serves to reflect one's emotional status out of mental state of the creator. The composition of lyrical pieces of work include all elements of art: feelings or opinions described, each word, each sound, punctuation marks, sentence and their order — one complete content is in organic link with the entitlement of that piece of work, in general. The entitlement of work is in a row of other elements of art that enrich and deliver the content of the work of poetry, and it deals with providing the completeness of meaning and composition. Because, "... entitlement of composition is the name of the composition, i. e. entitlement of composition is the manifestation of its content, which discloses the meaning of it" [1; 192].

In world literature entitlement of work is known to be explained in three types of direction: creative, referent, receptive. When creative initiative has a leading position in entitlement, author's technique of art, that is, his viewpoint (justifying or condemning, his evaluation) on events and incidents are reflected in the entitlement of work. When referent direction has a leading position in entitlement, the name of work is integrated and proportioned with the name of the hero, or with the name of an event or a certain circumstance, or with the name of a place or time. And, looking at a number of works by some of our writers and poets we witness that

they chose a name consisting of a sentence, a word or word order that has metaphor-symbolic description, imagery in naming their work. Entitlement of this kind arises a big interest in readers who have high competence. Here, we don't know right away what is implied in work by reading the name of work. So, reader has difficulty understanding the name of work, reader studies at the same level with the author. This requires from both reader and author to be intellectually well-educated and have high ethical competence.

In world literature we have scientists such as M. Tyupa, P. A. Florensky, L. S. Vygotsky, S. M. Schardzbant, U. Eko and so on, whose opinions are known regarding the differentiation of hidden content, imagery in the name of works and its importance.

Uzbek litterateur, A. Rasulov evaluates entitlement of work as initial semiotic or semiotic key together with genre and conception [5; 52–53]. In other words, entitlement of work is a source of the first reflection and perception of the work, i. e. it is a sign showing the way to semiotic centre, actual content of the work. Entitlement of work of art being minor and short, as well as avoiding repetition means text of art is composed very well and basis of art is firm. If a creator (poet) develops his work more and more maturing it in his thoughts and opinions the expected entitlement is formed at once.

One of the distinguishing features of work of art in receptive entitlement is that hidden imagery, multi-opinion and polyphony. So, receptive entitlement is directly linked with content of work. In Karakalpak lyrics one of the adroit poets in entitling a verse is I. Yusupov. He wrote verses that can be an example for receptive entitlement, such as "Sakhra Bulbili", "Arasatli Guz", "Taska kotergen gul", etc.

*"My Nukus, located along the Amu,*  
*You are the only golden flower of desert,*  
*In my fatherland Turkistan,*  
*You are one of the famous cities" [7; 23].*

Reading the name of the verse "Sakhra Bulbili" of the poet it is difficult to perceive what the verse is written about through entitlement. Because, when we say "Sakhra Bulbili", for example, we might understand a land located in the desert, or a girl living in the desert, or a flower growing in the desert, etc. And, as reading the verse it becomes clear that it is about the capital of the land Nukus city, where Karakalpaks, who are regarded as a nation in the desert, live.

Some titles might not be mentioned in the lyrics of a verse. But, thinking the meaning of the verse over the meaning of the entitlement and the meaning of work itself go with each other. For example:



“... giving the last piece of bread to his friend,  
Person goes down, his heart getting lower.

It is worth writing on his gravestone:

«Man is harder than a stone, subtler than a flower» [6; 98].

The entitlement of the verse “Taska kotergen gul”, work by I. Yusupov, is not repeated in lyrics of the verse, but the verse’s general meaning is assonant with the meaning of entitlement. In this case meaning reflected in the verse lyrics is subjected to the meaning of entitlement, i. e. meaning of entitlement has a leading position in the general semiotic basis of work.

As for the entitlement of the verse of the poet “Arasatli guz”, it impresses reader being both touching and being the fact that intended opinion is hidden (that is, multi-meaning of the entitlement). We know that autumn is sometimes rainy, sometimes warm and sunny, sometimes cloudy. Weather being changeable one’s inner world also gets worried, feels in trouble. And, the poet, I. Yusupov devotes his work “Arasatli guz” to war, which is completely different thing.

“Black clouds roam in the autumn sky,

Synopticians know where it will fall.

Ongoing war in Avganistan isn’t getting dry,

No one knows where the end of these things all” [7; 35].

The verse containing three conclusions in total gives a description of the current of that time, policy of the period, people’s vulpinism, the current aspect of the people in entitlement “Arasatli Guz”, i. e. it says about war neglecting human being, its damage and catastrophe brought about, and person’s feelings worried about the development of the world are assimilated with weather. The line in the verse “Black clouds roam in the autumn sky” is a bridge connecting the meaning of its entitlement and the meaning in the verse itself, which completes and organizes their meaning.

However, receptive entitlement shouldn’t be separated from the meaning of work. Because, entitlement is a small aspect of that work, or an accumulated shape of the work, which can also be called as its key. “... no matter if an entitlement of work consists of one word or word order, it accumulates the meaning and content of the whole work” [1; 193]. In order to fully understand the meaning of lyrics in receptive entitlement it is necessary to stop at its subject, compositional structure, world of image, methods to make more of an art, author’s intention, in short, each minor part of elements of art. Then, reader is satisfied with entitlements and their meaning.

In a karakalpak lyric poetry much there are verses the names hold own that. We see sometimes, that in majority case not traditional, free verses are written without title. Because in composition free verses a key point hatches in semiotic center and holds own the names.

Rhyme is one of the basic categories in Karakalpak poetry. Because, dimension, occupancy, rhyme set-up of poem structure is directly dependent on the number of syllable of poem lines, together with rhyme orders. This principle is strictly followed in most of the lyrical genres of Karakalpak poetry. These types of strict ritual principles of dactyls are not followed in vers libre genre (free verse) that came into our literature in the 1980 as a result of the investigations of our poets in the field of art.

In Karakalpak literature free verses might be with rhyme or without rhyme. Although rhyme is not complete, it can be replaced by sound repetition, matching words where syllable numbers are not the same. And, compositional integrity of verses that do not follow common rhyme regulations and how the peculiarity that is characteristic to lyrical verses is performed is considered below.

Litterateur K. Urazimbetov writes in his pieces of work: “to use words that do not have sound repetitions and sound assonances for

rhyme” is “to try to economize words to be used in literature study, or it is what is explained by emphasizing more on the meanings of words and opinions and the loss of rhyme in free verses comes from this source” [4; 116–117].

This peculiarity means that poets are away from monotony in poetry, thus understanding the diversity of creativity, and we don’t see the same picture of repetition in their pieces of work.

In some of the cases visualization is supplied by abstraction and symbolism in delivering an opinion. In the composition of these sorts of verses idiosyncratic description method, symbol, image are distinguished with a big size of metaphoric comparison.

*In Turkan valley looking at the Great Bear,*

*I think of my fatherland:*

*Present remains of the Great Turks here*

*Cutting down the Ox river land,*

*Peeling the skin alive,*

*Onto the Red sand and Black sand*

*Pouring the blood of Ox river land*

*The sand had never had with blood to thrive... [2; 44].*

In free verses emphasis is mostly put on logical implication, that is, not on the meanings reflected in lines or in couplet, but on the meaning of a word. In other words, in ritual verses of dactyl, while emphasis is put on rhyme in reflecting the meaning, in free verses each word serves as a component of general meaning and it has, on its own, got a point of symbolic meaning.

In the lyrics of B. Genjemuratov, S. Ibragimov, there are differences of writing verses sometimes in small letters, sometimes in capital letters, sometimes with punctuation marks, sometimes with no punctuation marks. This means, firstly, challenging a pupil to be even more attentive by various games thus strongly touching their emotional sentiments, and secondly, thoughts and opinions coming from the time when poet is inspired are delivered as they are.

*I’ll open all the doors*

*for you, spring.*

*Trunk of djieda tree,*

*gets swollen as a king*

*Moisture isn’t going though free [3; 3].*

We see a full point after each sentence construction in these lines of verse by S. Ibragimov, who used some peculiar landscape description. And some lines don’t start in capital letters like in ritual verses, and they there is no comma at the end of the sentence. Here, the poet deeply understood the importance of punctuation marks in keeping the full opinion, thus using a very good technique in delivering the state of lyrical hero. This composition can be explained like the stone properly set in mosaic art. Because, while a full composition (meaning) is formed by different shapes of each stone that are not set equally, in free verses word does the same function.

#### Conclusions:

1. The name of poetics content is easily associates with the meaning reflected in work. The name of poetics is short and it has imagery.
2. The title of poetics can be a core providing the semiotic basis of that work.
3. In karakalpak lyric poetry much there are verses the names hold own that. In composition free verses a key point hatches in semiotic center and holds own the names. Verses with no rhyme are mostly written in verlibre genre.
4. It doesn’t follow the criteria of ritual verses in full: stability in the number of rhyme and syllable is not kept. Words are of basic compositional functions in verses.

5. Since words in verses have metaphor-symbolic meanings and abstract pressure, they are rich in emotion and aesthetics. There is dominance of the fact that reflection of one's inner world is more leading than describing outer world, that an opinion is more leading than a shape.
6. In general free verses without rhymes are constraints of peculiar type in Karakalpak lyrics, but we can evaluate them

as they the results of lots of efforts of research poets did in the field of creativity.

We define the author's position through studying the name of poetics, the features of correlation between composition and content, the peculiarities of individual searching of the author in poetics. Giving the name of poetics to work requires big adroitness and artistic investigation.

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## Section 13. Philosophy

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### Facts and theories as elements of natural sciences and humanities

**Abstract:** Facts are considered in the article as independent, undeduced basis of the theory, which, in its turn, is understood as knowledge of the objects of reality that are not created by the subjects of culture and the essence of which is hidden from direct perception of the knowing subject.

**Keywords:** fact, theory, scientific knowledge, natural sciences, humanities.

Studies of the socio-cultural determination of scientific knowledge have led not only to rethinking of the methodological foundations of natural sciences and to a deeper understanding of the nature of science as a cultural phenomenon, but to a “dangerous convergence” between humanitarian and scientific knowledge also. The desire of humanitarians to prove the scientific status of their researches by the cost of losing the specificity of humanitarian cognition, on the one hand, and the willingness of scientists and methodologists of science to rethink the fundamental concepts of scientific knowledge, in particular — the concepts of “fact” and “theory”, in the postmodern humanitarian context — on the other, can be considered as “dangerous” to both forms of knowledge. In any case, some aspects of understanding facts and theories as the elements of scientific knowledge need to be clarified.

As a rule, it is emphasized that a fact is not a sense perception only (i. e. is not a displacement of the instrument pointer visible by scientist); that a fact is not accidental empirical data (i. e. is not just the decoded information of oscillograms expressed in the language of science); that a fact is not a statistical summary of empirical data, but a statistical summary with statistical interpretation [7, 178]. Saying that facts cannot be reduced to sense data, researchers rightly highlight the linguistic determination of protocol sentences, which are formulated with the use of well-defined terms of scientific language. However, scientific language contains in itself the possibility of any theoretical interpretation of the essence of the studied object. So, what is needed to be emphasized really is the difference of science from any other kind of cognitive activity.

Only science requires for its implementation a special practical activity — observations and experiments that allow scientists to record in scientific language those features of the studied object, which became apparent in the process of direct sensory contact with it. The very essence of fact as a form of scientific knowledge is that it contains information about sensually perceived characteristics of the studied object obtained in the process of observations and experiments. Just this information is the meaning of protocol sentences, which express the results of practical (material) interaction with the objective reality.

Since facts are independent, non-theoretical, undeduced basis of the theory, the function of which is the statement of the objective existence of certain characteristics (parameters, variables) of the studied object, facts cannot include a theoretical interpretation.

On the contrary, it is possible to say: the greater a portion of interpretation — the lower a portion of factuality is in the content of protocol sentences. Therefore, at the empirical level of the study every effort should be made to reduce the amount of interpretation in protocol sentences and statistical summaries of empirical data. Various methods of empirical investigation and gathering facts are developed in order to gain this purpose.

Modern methodology of the empirical research takes into account that measurement as an essential element of scientific experimental practice is a collection of special techniques, predetermining specific procedures of selection and allocation of the measured parameters of the object, the establishment of measurement units, definition of conditions and ways of implementation of the measuring procedures, etc. However, the assertion that scientific facts are constructions that get their status only in some theoretical context or that proven mathematical statement should be considered as a fact also, does not reflect the essence of a fact as the form of scientific knowledge [3].

Understanding that fact is knowledge about that and only that, which is given in sense perception, is of particular importance in the humanitarian knowledge [5]. The fundamental difference between natural sciences and humanities is that an ideal content of human activity that is the object of humanitarian studies is available for study only in material forms of its embodiment and can be revealed only in the process of interpretation of relevant material carriers. It means that protocol sentences and statistical summaries in humanitarian cognition can relate only to the material carriers, but not to the ideal content of products of socio-cultural activity. Attempts to present interpretations of an ideal content of various sources as facts lead to the distortion of the essence not only of fact as the form of scientific knowledge, but of the specificity of humanitarian cognition as well. It is delusion to think that there are some “specific facts” in humanities, which include evaluations, opinions, predilections, and so on of the knowing subject [2; 4], because any statement, the terms of which do not have sensually perceivable referents, just is not a factual statement.

As a special form of knowledge scientific theory arises because there are such levels of essence of the studied objects of reality that cannot be known through direct sense perceptible contact with them in the process of observations, descriptions, measurements, classifications, and any other methods of empirical

studies [1; 6; 8]. In order to understand causal relationships at this level of essence, which is inaccessible for sense perception, a special — theoretical — means are required: ideal objects, theoretical schemes, thought experiments, etc. These means allow scientists to create an ideal, hypothetical model of the studied object, on the base of which, in turn, it is possible to carry out a particular kind of scientific practice — experiments, to interpret existing empirical data and to search for new data.

Theory is the invention of philosophy and natural sciences dealing with natural and social objects, which are independent of human will and activities in principle. Since the basis of the existence of these objects is unknown and cannot be known empirically, the knowing subject has to invent, to design a special — theoretical means of knowledge. The emergence of the theory in natural science and humanitarian knowledge is the result of creative, constructive activity of the knowing subject, because there is no methodological algorithm that allows deducing the original principles of the theory from aggregate of empirical data. In this sense, any hypothesis/theory is an ideal interpretation of facts.

Whatever kind of characteristics of a scientific theory researchers would single out, the chief among them is a consistency (“coherence”) of the theory, deducibility of all its claims from a few source principles. This attribute expresses the very essence of the theory as a form of knowledge: an attempt of a knowing subject to penetrate in the essence, in the basis of existence of a studied object that allows explaining (derive) phenomenon observable at the empirical level of scientific research. Not being a logical consequence of the available empirical data, scientific theory gives the possibility not only to formulate the laws underlying these data, but to predict also those data that scientists will be able to produce in experimental practice many years later perhaps.

The functional significance of empirical level of knowledge is not in its allowing scientists to derive a theory by inductive generalization, but in its providing an independent of theory, undervived basis of facts, without the conformity with which no any scientific hypothesis can obtain the status of the theory. The independence of studied object from the adopted conceptual scheme appears in the possibility to describe any experiment and obtained empirical data in terms “neutral” in relation to this conceptual scheme. In the simplest case, such a description can be done in everyday language. If the invariant set of empirical data does not exist, it is meaningless to say that we have one and the same object or a fragment of reality.

The fundamental difference between humanities and natural sciences is that the objects of humanities are not only objective socio-cultural reality, but the products of human activity as well. The basis of existence of socio-cultural reality as a form of Being, like the basis of existence of nature, does not depend on the will and

desire of man as the subject of socio-cultural activities and cognition. Therefore, it is necessary to create theoretical models of society and culture, which are giving the opportunity to penetrate the essence of socio-cultural reality that is hidden from direct perception.

However, the basis of existence of the products of human activities is in the human activity itself. These products (results) exist only because such is the will of cultural subject as their creator (author, producer). If the will of subject creating a material product is significantly restricted by the laws of nature, the will of subject creating a spiritual product is limited only in the selection of material carrier, but not in the producing of an ideal content, which may be contrary to any laws of nature.

Since theory as the form of knowledge arises and exists only because the basis of the existence of certain objects does not depend on a person and is not known to the knowing subject, it is obvious that theory of culture as a particular reality is possible, but theory of a museum or literature is impossible. Subjects of culture may create any museum and any books, guided exclusively by their own views about these products of human activity and introducing a variety of reasons for their existence.

Identification of scientific theory with any combination of more or less consistent reasoning about the object of knowledge has made possible the introduction in the postmodern humanitarian discourse of the term “narrative theory”, which contradicts the original meaning and functional value of theory in the structure of knowledge. That, which humanitarians call by such terms as “museology”, “musicology”, “narratology” etc., is literally “the word” (story, narrative) describing a history of various products of human activity or generalizing experience of their creation, but not a theory.

Theory as a form of mental activity is neither a narrative, nor a description of the sense perceptible existence of the object, but the ideal form of penetration into the essence that is hidden from direct perception not only in everyday practice, but even in a special empirical interaction with cognitive reality. As a necessary element of natural sciences and humanitarian knowledge the theory arises only when the object of knowledge is not created by man as a subject of culture and the basis of its existence is not known to the knowing subject.

As to the facts as the element of natural sciences and humanities, it ought to be emphasized that finding of facts is a practice not of talking, but of material interaction with studied object, the result of which is not a mere linguistic introduction of terms, but a sense perceptible verification of the contact with objective reality. Any interpretation, the terms of which do not have sense perceptible referents, is a structural element not of a fact, but of a hypothesis/theory. Fact as undeduced knowledge always refers to the practical verification. Fact can be installed, updated or refuted only as a result of practical contact with the studied object.

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## Scientific text as a special form of communication

**Abstract:** It is asserted in the article that scientific text, even being a product of spiritual culture, never ceased to be the main form of an objectivization of scientific thought and the means of special scientific communication.

**Keywords:** science, scientific text, scientific knowledge, scientific communication.

There are two extremities in understanding of scientific text. The first one is demonstrated by common sense and public opinion which believe that absolute truth can be gained “now and here” in this scientific text or experiment, that scientific knowledge has impersonal character and that scientific information is absolutely independent from the author’s form of its expression. The second one was developed in 20<sup>th</sup> century in some trends of philosophy and methodology of science which made no difference between scientific and any other texts — from mythological to fictional. Despite obvious exaggerations in both extremities there are some reasonable aspects which would be useful to consider.

First of all, neither common sense nor methodology of science have ever been mistaken in understanding of the scientific text as the main form of presentation of scientific thought, without which scientific thought could not exist as a social phenomenon, could not be stored and transferred in the process of scientific communication.

Like any other product of spiritual culture, objectivized knowledge ceases to be just knowledge, dying in material form of its embodiment, such as books, magazines, tapes, diskettes and other carriers. Knowledge as the ideal image of reality can exist solely in the mind, as its component, as a “living thought”. So the page scribbled with formulas is not mathematical knowledge as such, if there is no consciousness that is able to read these formulas and extract from them some ideas. And if no scientist on Earth can decode, de-objectivized the content of some scientific text, it means that society has lost a certain amount of knowledge and that, despite of having the material carrier of the result of scientific activity of previous generations, scientists cannot reveal the content of knowledge encoded, objectivized in this scientific text.

In order to find, to understand, to assimilate the knowledge potentially contained in scientific texts, a scientist must “learn to read” these texts, in other words, he must learn to extract from texts that content which will be recognized by him as knowledge. In the process of training and communicating with members of the scientific community, a scientist learns the language, concepts, ideas, principles of a particular scientific tradition and obtains not only the social status of a member of the scientific community, but the way of interpreting scientific texts consistent with some tradition as well.

Linguists, philosophers and methodologists of science have come to the conclusion that de-objectivization of the content of scientific text is a complex act of the communicative-cognitive activity, when the fate of the original communicative intentions of the author is solved at the level of perception and interpretation of texts. It means that a thought is not hidden behind a text and is not a spiritual substance of a text; it arises as a function of text in the procedures of its interpretation [1, 64–65], whereas the text is that immediate reality, through which the researcher seeks to enter into a dialogical relationship with the author of the text in order to understand it [1, 72].

The analysis of the development of scientific knowledge indicates that the birth as the inheritance of ideas in science is governed

not by dynamic, but by statistic laws, according to which the fate of each specific publication, containing a result of an individual research work of a scientist, is unpredictable. Studies have shown that the fate of the concept or semantic information contained in the text is solved often by the interpretation of the content of the text, which won a place in public practice by virtue of being statistically more often than any other, conformed to the spirit of the time, public interest, etc. The probability of inclusion of some result in the body of scientific knowledge is determined by a complex interplay of objective and subjective factors, among which a significant role is played by the form of expression of knowledge in the author’s text and the character of manifestation of the author’s origin in it.

The fate of an idea or concept recorded in scientific text depends in a very direct way on the author’s form of expression of his ideas, because understanding of individual characteristics of the theoretical language and logic of reasoning of an author is often no fewer complexes than the scientific problem that he solves. So, for example, the book “Aether and matter” of Joseph Larmor, “indigestible” even in the opinion of such eminent physicists like M. Born, contained in embryonic form the basic ideas of the theory of relativity. However, outside the specific logical and linguistic form that certain information received in the works of H. A. Lorentz, it was generally not accepted by the scientific community [3, 17].

Scientific text is the object of study, assimilation, critique, refutation in the process of interpretation; it is seen through the prism of various cognitive goals and tasks, under the influence of different socio-cultural, historical and individual peculiarities of scientific style of thinking. And although the de-objectivization of scientific thought does not require instruments and performers, the ideas obtained by any subject in the process of interpretation of a scientific text is the result of “joint activity” of the author of this text and of the subject perceiving it to the same extent as the musical composition is the result of “joint activity” of the composer, performers of his works and listeners.

Conceptuality as deeply permeates the language of science, as a native language permeates the language of fiction. But if the “language of Shakespeare” is not English language only, but the totality of artistic means of creating drama and poetry of Shakespeare, the “language of Newton” is not the English or Latin languages at all, but the language of classical mechanics. And the “language of Newton” is translated into “the language of Einstein” to the same extent, in which “the language of Shakespeare” is translated into “the language of Ionesco”. The incompatibility of artistic means leads to an equally complete loss of artistic content, as the theoretical incompatibility — to the loss of the original conceptual meaning.

Ultimately, talking about the possibility of a completely adequate translation of scientific information into any language is possible only for the most formal part of scientific language — mathematical apparatus, though just the mathematical apparatus does not need in translation. However, the translation of the theoretical

comments to the mathematical formalism will inevitably be associated with the semantic losses, increasing with the increasing conceptual differences in theoretical languages. Even at the level of linguistic expressions of the sense data there are significant differences, which increase at the level of theoretical explanation. “Deflogisticated air” and “oxygen” are not just different names for one and the same gas released by heating mercury oxide; this is the concepts of two different theories of combustion, and the meaning of these concepts cannot be adequately expressed in the language of theory inconsistent with them [4, 167–168].

Yet, there is prejudice not only in ordinary but even in scientific consciousness that the content of scientific text exists independently of the will of the author of the text, that scientific information is transmitted in the form of monological message of the sender to the recipient [2, 241], and, in contrast to the art-information, is not born in the process of communication of a perceiving subject with the author of the scientific text and is not a result of their joint activity. We cannot ignore the fact that even if the idea of the independence of scientific information from the forms of its expression and of the individuality of scientist is illusory, this illusion is created and maintained by scientists themselves during the actual research activities. Despite neither in natural sciences nor in humanities understanding of the text is absolutely identical to the author’s intention, science, unlike art, is not only indifferent to these semantic losses, but deliberately includes them in its epistemological program. Why does it happening on?

Answering to this question, we could say that the indifference of science to the inevitable loss of scientific information during the conceptual transformations occurring in the process of perception and inheritance of the result of an individual scientific creativity is due not to the absence of losses themselves, but to the need of including this result in different theoretical contexts, without which neither understanding and verification of its content, nor transformation of the identified semantic invariant in intersubjective scientific knowledge are possible.

The meaning of cognitive activity of an individual scientist is to achieve such a result, which will be recognized by the scientific community as scientific knowledge. As a social phenomenon, scientific knowledge exists only within the scientific tradition, as ideas that are passed on from generation to generation and are really de-objectivized at every moment of time. This means that, only assuming the

result of individual research activities as its own and including it in the process of scientific communication, scientific community makes this result a fact of social consciousness. And only in the process of continuous rework and convert of a new result scientific community can identify its true content.

Scientist perceiving and interpreting scientific text maintains an internal dialogue with the author of the text while at the same time he is alone with his own thoughts, guided by his own philosophical concepts, methodological attitudes and theoretical preferences. The effect of understanding of someone else’s text occurs only when the text becomes a source of thought for a scientist perceiving it, when a scientist as interpreter identifies in the text such a content that is consistent with his own ideas and that might contribute to the decision of problems, which this scientist studies. That is why every subsequent interpretation of scientific text may reveal new meanings or new access to the content of it, sometimes very far from the original author’s intent.

So, if we turn to the history of the Copernican revolution, we will see that, reading Copernicus and Ptolemy, Kepler perceives specifics not of the ideas of his great predecessors as such, but of planetary motions emerging through these ideas. Kepler understood Ptolemy better than Copernicus and Galileo did it, and understood Copernicus otherwise than Galileo, because he was looking for answers to those questions that neither Copernicus nor Galileo think about. Moreover, being convinced Copernican, Kepler made a decisive contribution to the change in the initial concept of Copernicus, completely destroying in the kinematic scheme of Copernicus that exactly in what the author himself saw the basic meaning of heliocentrism: the principle of uniform circular motions of the planets [5; 6].

But whatever a degree of uncertainty in establishing facts, in formulating problems, in using criteria of truth would be scientific texts turn neither into novels in which fictional characters express the author’s ideas, nor in philosophical treatises about the nature of existence or in the humanitarian research of value content of human life. For a scientist, exploring the natural processes and phenomena, to understand the scientific text means to understand the peculiarities of the studied material object, recorded in this text. Reading scientific text, naturalist seeks not for understanding of cultural, historical or individual specifics of the ideas of his predecessors and contemporaries, but for the decision of some scientific problem.

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## Section 14. Economics and management

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### Management personnel classification by skill level and creativity

**Abstract:** The author's method of classifying managerial personnel by skill level and creativity. The features of construction, benefits, application ways and numerical examples of the developed algorithms. Formation of groups (classes) occurs spontaneously. The results of testing on real data algorithms are presented. It is shown that the presented algorithms can be applied for the selection and evaluation of ideas and in the implementation of the procedures of brainstorming.

**Keywords:** Algorithms of classification, decision making, professional knowledge, creativity, Kemeny distance and median.

#### Statement

It is common knowledge that more than two hundred countries in the world target market economy. Although living standards of these countries vary dramatically. In the countries with market economy (even those located in different administrative-territorial entities of the same country) **per-capita income** and average GDP growth per capita for 5–10 years **differ** by several times, **life expectancy of the population** — by 1.5 times, and share of people with higher education, level of education, relative number of grave offense and crime detection rate, design **resource intensity**, manufacture and appliance of the same products, **productivity of social labor**, etc. — **by ten times (!)**.

Moreover, the following group of countries consistently gets among 10–12 % of the total number [1]:

- with different soil and climatic conditions;
- with a variety of natural resources, i. e. both with or without mineral resources;
- with different preferences with regard to nutrition and different traditions;
- with different physical abilities and mental characteristics of the population (tall people and not very tall, phlegmatic and choleric, etc.);
- with different, sometimes negligibly small areas suitable for any type of economic operations;
- with different objective possibilities for accelerated development: as a result of wars the productive capacity in some countries was almost completely destroyed, other countries haven't had wars in hundreds of years.

The presence for many years of such different in objective life conditions countries among the 10–12 % group of leaders can be explained by the fact that the remaining 90 % of countries LEAD those DIFFERENT in skills level, features and team peculiarities “drivers” to effective market. For the entire history of human civilization world rankings results suggest that hardly the most skillful and qualified people are at the pinnacle of power.

It is obvious that the *greater the variation in the professionalism level and abilities* of the management personnel (MP) is, *the more noticeable will be the difference in the standard of living* of the people that are **managed** by this MP.

The question is, how to choose among ambitious candidates wanting to get into the management those who can be *trusted to take*

*care about their own living standards*, comfort of **their**, unfortunately, short existence in this world? How to detect, identify and support those altruists and professionals, knowledgeable and capable management personnel?

Find the tested repeatedly algorithms which could contribute to the solution of this complex issue below.

#### Introductory remarks

1) It goes without saying that people differ by level of their professional knowledge and abilities which they endowed from nature. Thus, out of hundreds of millions of chess players only 3–5 people will be able to play 20 games “blindly”, and only one person in the world (Alekhin A. A.) managed to play “blindly” 32 games. It is obvious, therefore, that one who can foresee 4 moves ahead (or is able to visualize 4 steps of the algorithm for problem solution), *will not be able to convince the person who is only able to see 2 moves ahead about the correctness and validity of their decision* (say we talk about the selection of the **way of economy development**). In chess game everything is much simpler: the correctness can be proved by the actual game, and the error in the calculations **will not have negative impact** on other people's lives).

Moreover, a very significant influence of individual abilities on the **speed** of awareness of the possibilities of **practical application** of gained knowledge and actual implementation of these possibilities has been proved once again (see [2, 3]). It turned out that the same level of initial training and conditions of the experiment with increasing complexity of work increments the *amount of right-sided asymmetry* of the distribution of time spent on work performance.

2) With the development of scientific and technical progress (STP) *even very responsible and capable MP* can master less and less of the actual information. So, in modern conditions due to the continuous acceleration of STP, reduction of the period of knowledge duplication, snowballing growth of the number of publications in most areas of science and technology, only few people can maintain the leading positions even in a narrow field of knowledge long enough. Accordingly, the intensity of appliance of expert methods in the foreseeable future will only increase. Moreover, increase of the number of experts involved could increment the scope of knowledge of the newly created team of MP — union of sets **A–E** in Fig. 1 (not always though, depending on the composition of participants of the examination).

3) In conditions of widespread use of the Internet among *amateurs, frauds, ambitious personalities* and people who just want to draw public's attention, have more opportunities to stand out with "reliable" forecasts, "useful" tips, potshot of "all and sundry" and similar kind of "noise".

4) Modern information technology (IT) allow store and quickly provide detailed information on each citizen of planet Earth, including on any MP candidate, quality of their forecasts, tips, actions (proper and not). That IT provide the **opportunity** for every citizen in every country in the world to see clearly for whom they vote — for a real person, previously confirmed their professionalism and creativity, or for a "pig in a poke." After all, during the debate before the cameras a candidate for election can be represented as pro-altruistic and *promise whatever the potential voters want to hear*.

5) With the introduction of new technologies, more efficient hardware and software programming, the lag (delay), i. e. time from capital investment to value realization or period of time between the realization of actions and achievement of the results from this action) has dramatically reduced.

6) Identify MP which has the maximum knowledge in particular subject area is not easy. And it is easy to prove. Figure 1 shows a Venn diagram of the scope of knowledge possessed by individuals A–E communicating with each other. It is easy to see that individual A can hardly doubt that individual C, who has a lot in common with A, is smarter than individual B. B, in their turn, for the same reasons will consider D to be smarter than A. However, they will be convinced that E is a very limited personality, although the latter has in fact a broader based knowledge than A, B, C and D all put together.

Under these conditions it is impossible for E to prove the greater efficiency (productivity, usefulness) of their proposal to individuals A or B if to prove that E would use knowledge which he has no intersection with what A and B know. However, as opposed to the case connected with innate abilities, lack of understanding of individual E's position is due to differences in the amount of knowledge of the individuals.

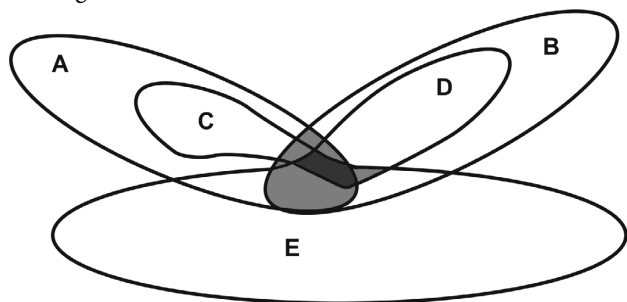


Fig. 1. Scope of knowledge which individuals A–E possess

#### Algorithm № 1: Stepwise specification of objects ranking

As a part of our contractual works with the plant Rostselmash and the large agricultural enterprise "Manychesky" (in the machine-tractor fleet there are more than 150 combine harvesters) it was supposed to build statistically significant regression models to forecast losses, micro damages and granulation of crops during the process of harvesting. The results of combines tests in different soil-climatic zones carried out by the machine-testing stations (MTS) of the association "Selkhoztekhnika" served as the initial information. However, it turned out that there are a lot of factors, but the initial information table is not fully completed: values of a number of factors during the tests were not registered.

And if we ignore such experiments then due to the limited number of observations regression models will be statistically insignificant

and have poor forecast characteristics. Therefore, to highlight the main factors we proposed an original algorithm [4] of stepwise clarification of objects ranking (ordering) (SCOR) — an expert survey for specialists (test engineers, combine operators, agronomists), involving the integration of the Delphi method (developed by O. Helmer, N. Dalkey, T.J. Gordon to forecast the future — see also [5; 6]) and technique developed by John Kemeny [7; 8] to obtain the **panel of experts consensus**.

#### Algorithm description № 1 SCOR

The proposed algorithm turned to be a very productive and was repeatedly used by the author and his colleagues while handling of applied problems [9]. Its main feature is that:

a) the Delphic procedure is used to rank the factors and objects (and not to forecast the future);

b) **Kemeny distance** (proximity measure in the linear order relationship) is used for the quantitative analysis of the degree of experts' opinions convergence after each round of surveys, identification of the coordinated panels of experts and assessment of the feasibility of the termination of the examination, and **Kemeny median** is used as final ranking (later, in 1978, the theorem which states that "Kemeny median is the only resultant strict ranking which is neutral, consistent and justified at the level of perception").

So, if  $m$  experts should rank  $n$  objects in accordance to one of the factors of consumer appeal, for example, "maintainability", then several rounds of surveys are hold. After the analysis of the results of the next in turn survey, the average, minimum and maximum ranks for all  $n$  objects are marked together with the expert explanations made in defense of the far different responses. Each ranking is presented in the form of matrix in the canonical form and then Kemeny proximity measure (distance) between all rankings is calculated. Kemeny distance  $d_{ij}$  numerically characterizes the degree of mismatch between the rankings of two experts ( $d_{max} = n(n-1)$ ).

In matrix  $D = \{d_{ij}\}$ ,  $(i, j \in m)$  all  $(m-1)m/2$  distances between the rankings are presented.  $D$  — symmetric positive matrix with zero diagonal elements. The sum of the  $i^{\text{th}}$  row of  $D$  matrix corresponds to the value of mismatching of  $i^{\text{th}}$  expert with the rest. Comparing the sums of all elements of  $D$  matrix obtained after each round of surveys, we can estimate the rate of convergence of the experts' opinions and determine the most (least) matching ranking and allocate the most matching groups of experts (by selecting different threshold values of proximity measures  $d_{ij} \cdot \mathbf{J} \mathbf{e}_a$ ). If the experts' opinions on the objects are identical:  $d_{ij}^0 = 0$ , if opposite:  $d_{ij}^0 = 1$ .

**Classification procedure (grouping)** of the members of the expert survey for the algorithm № 1 SCOR includes the following operations:

- Transfer of the elements of distance matrix in relative units. Selection of distance threshold values and assessment of the degree of responses matching within 80, 90 and 95 percent.

- Conversion of the matrix of the Kemeny distance relative units in according to the selected threshold values.

- Grouping of respondents considering the selected MP opinions matching degree.

- Ranking search maximally coherent with the **selected group of interconnected answers**.

#### Algorithm SCOR approbation

The considered algorithm was used by the experts in the process of defining of the significant factors for the developing of the regression models. The examination involved several hundred of professionals working in different soil and climatic zones. As a result of extensive research a subset of determinants was defined and numerous (several dozen) of statistically significant ( $R^2 > 0.9$ ;  $F_{kp} > 100$ ) regression



models (see: [10]) which have good forecast characteristics (for different soil-climatic zones, different harvesting conditions and different cultures) were created.

However, the analysis of the statistical characteristics of the created regression equations revealed an interesting **feature**: in many cases, the ranks of **b**-coefficients, characterized by the ratio  $b_i/\sigma_{b_i}$ , were predicted by separate groups of experts, but **not as a result of Kemeny median calculation**.

Thus, it turned out that some **spontaneously formed group of experts** has more expertise than any other group. But to discover, identify such a group was, unfortunately, possible **only after the retrospective analysis of already resolved problem**, i. e., after the analysis of the constructed regression equations it was possible to figure out **who** ranked the main factors to be included in the forecast regression model correctly.

Later, working in the Institute for Advanced Studies (IAS) for managers and specialists [11], we proved (in the course of the training sessions with the IAS audience — enterprises directors, chief engineers, chief economists, chief accountants) **the validity of the results** of the MP spontaneous classification. So, for the classification of the level of professional competence in a particular field the audience was offered previously solved problems (by someone or in some other country), but the fact that the problems have been solved was known only to the organizers of the expert survey. Indeed, as a result of step by step procedure **there was formed a group** the participants of which **approximated to a solution of the problem better** than participants in other groups; they properly defined conditions and factors affecting the possibility of solution. For the *classification by level of associative thinking* **the same students** were offered to find solutions for the tasks from the **different subject areas** (mostly from books on entertaining mathematics, physics, biology). Also some small groups of MP with a more developed **associative thinking** were defined.

**Algorithm № 2: Stepwise clarification of index values with estimate of measure distribution**

The peculiarities of the algorithm № 2 are: firstly, usage of multi-step procedures, at each step of which the simulation modeling is carried out, and, secondly, integration of the Delphi method with expertise aimed to generate a generalized opinion of the expert group on the possible range of the required parameter value.

Let's assume that the *integration* with the Delphi method is implemented. But the question is how to determine that the collective opinion has stabilized and it is time to stop further questioning?

With what probability, for example, the certain value of the required parameter will not be exceeded? What is the probability that the index value will remain in confidence limits? The list of such questions could be continued.

To answer these questions the following steps are implemented: Assessment of each  $i^{th}$  expert on the  $j^{th}$  step  $E^{(j)}$ , then they are approximated by an equal (if the expert pointed out two index values) or triangle (if they specify three values) distributions (see: [12–14]). Generalized collective opinion of  $n$  experts on the required value of the index is defined as the average of  $n$  random values with equal or triangular distributions through the implementation of each  $k^{th}$  step of simulation modeling of the function  $E^{(k)}_{ob} = (\Sigma E^{(k)})/n, (i \in n)$ . The software [15] is used as a tool of simulation modeling allowing to create a simulation model with a minimum of effort (in automatic mode).

As a result of simulation modeling at each  $k^{th}$  step the statistical characteristics (expectation, variance, coefficient of variation, kurtosis, asymmetry) and **distribution** (table and histogram) of the parameter values of the function  $E^{(k)}_{ob} = f(E^{(k)})$  are obtained. After each step (examination cycle) members of the expert group are introduced to the grounds given in support of the far different index values assessments, and are offered to change their previous answers if desired. At each next  $j^{th}$  step the change of the values of the coefficient of variation  $C^{(j)}_{var}$  of the function  $E^{(j)}_{ob}$  is assessed.

In case of a different value of the coefficient from the previous value, eg, by 5% or less it can be considered that the experts' assessment are stabilized and it is possible to finish the examination. On the basis of the last step of the simulation modeling results the confidence limits of the index values and the probability that these values will be greater or less than a specified number are evaluated. The automated synthesis of the simulation models in the implementation of the algorithm allows to reduce the cost of manpower to obtain the required index values.

**Peculiarities of the groups' formation in the process of application of the algorithm № 2 SCIVEMD**

Let's suppose that the final table of experts' answers regarding the values of the required parameter — demand values for the particular product, damages caused by the implementation of enterprise security threats, implementation of specific operations of the business process, losses from possible non-amicable competitors sanctions, time spent on hacking the information system, forecasted time of problem resolution, etc. — has the form, for example, presented in Table 1.

Table 1. – Results of the four steps (rounds) of examination

Expert	Step 1			Step 2			Step 3			Step 4		
	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
E <sub>1</sub>	3	5	9	<b>5</b>	<b>6</b>	<b>9</b>	<b>6</b>	<b>7</b>	<b>9</b>	6	7	9
E <sub>2</sub>	30	33	65	<b>15</b>	<b>20</b>	<b>30</b>	15	20	30	15	20	30
E <sub>3</sub>	2	5	9	<b>4</b>	<b>5</b>	<b>8</b>	4	5	8	4	5	8
E <sub>4</sub>	8	11	15	8	11	15	8	11	15	8	11	15
E <sub>5</sub>	3	5	8	3	5	8	3	5	8	3	5	8
E <sub>6</sub>	14	17	22	14	17	22	14	17	22	<b>12</b>	<b>14</b>	<b>20</b>
E <sub>7</sub>	11	15	19	11	15	18	11	15	18	11	15	18
E <sub>8</sub>	20	25	55	<b>15</b>	<b>20</b>	<b>35</b>	<b>10</b>	<b>12</b>	<b>22</b>	10	12	21
E <sub>9</sub>	12	15	35	<b>10</b>	<b>15</b>	<b>25</b>	<b>8</b>	<b>11</b>	<b>15</b>	8	11	15

Note: \* — Index values changed by the expert during the next in turn step are marked bold.

The challenge now is to identify a group of experts whose opinions on the values of the required index are close enough. To this end, the following operations are carried out:

- Approximation by equal or triangular distributions of the statements of each expert and implementation of simulation modeling. As a

result of the simulation modeling distribution of the required index values by each expert in the form of bar graphs and tables is obtained;

- Index values from the distribution table are selected, which, for example, those which will not be exceeded with a probability of 0.8; 0.9; 0.95.

• Definition of the generalized distribution of index values as a summary of all participants' of the examination opinions by carrying out the simulation modeling.

• Elaboration of the table that lists the number of experts whose opinion on the value of the required parameter in the generalized consistent distribution of values (among all experts) turned out to be in the range of the selected probability.

#### Example of the classification (grouping) of experts

Table 2 shows the simulation modeling results after each of the four examination steps (see The results of examination in Table 1).

Note: Such small number of experts in this example is sufficient to explain the features of the group. It is obvious that in the

conditions of the Internet usage, the number of participants in the examination of experts may be hundreds or thousands.

As follows from Table 2, the examination can be finished as value:

$$|C_{var}^{(03)} - C_{var}^{(04)}| * 100 / C_{var}^{(03)} = 2.08\% < 5\%.$$

Table 3 shows the values of the required parameter obtained with probabilities 0.8; 0.9 and 0.95 as a result of simulation modeling of each expert's statements.

Experts grouping results in accordance to which the required index values fall into generalized (final) table of distribution in the range with a probability not exceeding, respectively, 0.15; 0.3; 0.5; 0.7; 0.85; 0.95 are presented in Table 4.

Table 2. – Modeling results (steps 1–4)

Parameter	Step 1	Step 2	Step 3	Step 4
Variable	$E^{(01)}$	$E^{(02)}$	$E^{(03)}$	$E^{(04)}$
Number of iterations	1000	1000	1000	1000
Average	17.51	13.7	12.24	11.98
Dispersion	2.02	0.61	0.37	0.36
Standard deviation	1.42	0.78	0.6	0.6
Coefficient of variation, $C_{var}^{(01)}$	0.08	0.057	0.049	0.05
Asymmetry	0.3	0.08	0.08	0.15
Kurtosis	-0.22	-0.12	-0.24	-0.35
Minimum	14.2	11.4	10.36	10.38
Maximum	22.4	15.88	14.15	13.85
Modal interval	17.18: 17.93	13.44: 13.84	12.08: 12.43	11.64: 11.95

Table 3. – Values of the required parameter obtained with probabilities 0.8; 0.9 and 0.95

Expert	Probability		
	0.8	0.9	0.95
	Values of required parameter		
E1	7.9	8.2	8.55
E2	23	25.5	27.2
E3	6.5	6.9	7.3
E4	6.4	6.9	7.25
E5	6.25	6.75	7.2
E6	17	18	18.6
E7	15.8	16.3	17.1
E8	16.6	17.65	19.1
E9	12.55	13.4	14

Table 4. – Interconnected experts' groups

Probability					
0.15	0.3	0.5	0.7	0.85	0.95
Matching value of required parameter					
11.1	11.3	11.6	12	12.3	12.6
Interconnected experts' groups with probability 0.8					
1, 3, 4, 5	–	–	–	–	2, 6, 7, 8, 9
Interconnected experts' groups with probability 0.9					
1, 3, 4, 5	–	–	–	–	2, 6, 7, 8, 9
Interconnected experts' groups with probability 0.95					
1, 3, 4, 5	–	–	–	–	2, 6, 7, 8, 9

#### Peculiarities of the algorithms implementation:

1) Activation of PM intellectual activity by means of providing professionals involved in the examination with the possibility to consider the **objections and suggestions** of other members of the expert group in the atmosphere free from the influence of the personal qualities of the participants. The ability to use the so-called "informed instinctive judgement" by professional experts by creating the conditions for active interaction with other professionals in

areas related to the various aspects of the problem being studied. This face-to-face interaction of the professionals with each other is replaced by a sequence of steps, each of which implements a **complete examination cycle**, including information specialists and experts on the results of the previous step.

2) While using algorithms the correct quantitative measurement of time (step number) of the expert survey completion (depending on the value of the coefficient or Kemeny distance variation) is provided.

**Suggested mp classification option**

To classify PM in accordance to the professional knowledge level, it is suggested to implement the following steps:

**Step 1:** Create a database (DB) for each of the urgent problems which will contain information about the countries in which the results of the problem solution were obtained (both positive and negative), including information about the **main factors** that influence the problem, about the **actions implemented** by the government of the particular country to address the problem, about the **actual result of solving the problem**, and about the time and resources consumption to solve the problem.

**Step 2:** All members of MP (and potential candidates) are informed about the problem in question, conditions and current task. **EXAMPLE. Problem:** A large number of accidents and **high mortality** of pedestrians, drivers and passengers on the roads. **Conditions of the problem:** the number of cars per 100 thousand of population. **Problem:** How to reduce deaths and injuries on the roads?

**Step 3:** MP is required:

3.1. Applying SCOR algorithm:

- **Identify and rank the factors** that have a major influence on the matter under consideration;
- **Identify and rank the actions** that have to be implemented to address the problem.

3.2. Applying SCIV EMD algorithm:

- Estimate **time and resources** needed to address the problem.

**Step 4:** As a result of the sequence of steps in accordance with the algorithms № 1 and № 2 the MP **classification is obtained** — a group of interconnected MP (according to the degree of similarity of answers about the factors, action, time and resources required to solve the problem).

**Step 5:** Search of the groups in which MP answers are “close” to the best solutions in the world practice. MP in this group **possess high professional knowledge, they should be involved to resolve such problems.**

Created database can be used not only to allocate MP with high professional training **in specific subject area**, but also to identify MP with a more developed *associative thinking*. The only difference is that the participants of the expert survey are offered to resolve the problems from different areas from the database that have already been settled in other countries of the world.

**Ways of algorithms appliance**

The considered algorithms are correct, repeatedly tested and confirmed their application utility in the process of their appliance in various subject areas. Moreover, in addition to MP' classification, ranking (ordering) of objects, stepwise clarification of the index values with estimation of distribution characteristics, the algorithms can be used for the **evaluation and selection of the promising ideas** derived from brainstorming — at the **stage**

**of ideas selection, ordering and evaluating.** Indeed, in this case, the **advantage** of the algorithms is that:

1) specialists' **grouping** evaluating the results of brainstorming **occurs spontaneously** without pressure from the outside, without the involvement of third-party guides, under the conditions of the elimination of the negative influence **on the result** of the implementation of the algorithms of the presence of the chiefs and subordinates among the survey participants (there is no effect of “agreement with the authorities”), friends and enemies, persons with different cultural and religious traditions, etc., as the respondents:

- **do not know**, as a rule, who participates in the survey;
- **do not know**, who responded and what decision made;
- **do not know**, who and which comments wrote;
- **cannot know** (as in our case) about the true purpose of the organizers of the expert survey;

• **but** at each step **can see** all grounds for the decisions of the respondents and the general consensus of all of the respondents (average values after each step);

2) In case of using the **Internet** the quantity of professionals involved in the selection and evaluation of the usefulness of ideas, can reach hundreds and thousands. Therefore, **a part** of such experts may be talented, gifted by nature people competent in the subject areas not related to the problem to be solved. And, as practice shows, these are the people who most likely to be the authors of the original proposals for the new areas of application of the idea, obtained in the process of brainstorming or who provide the most convincing grounds for the selection of a particular idea.

3) increase the reliability of results in the stages of selection and evaluation of ideas by providing participants with the opportunity to justify and specify their answers, for example, specify the **range of index values** characterizing the utility of the ideas and get the statistical characteristics and the distribution of the estimated parameters as a result of the subsequent simulation modeling and stepwise procedures.

**Conclusions:**

1. The author's method of MP classification by skill level and creativity allowing at the same time through the use of the information contained in the DB **increase the quality of decision-making** at all levels of economic management by providing MP with the information about the **best** of the options implemented by the **international community to solve urgent problems.**

2. The features of creation, benefits, ways of application and numerical examples of the developed algorithms have been presented.

3. It has been proved that the given algorithms can be applied in the implementation of brainstorming — at the stage of **selection, ordering and evaluating of the ideas.** The advantages of the algorithms that provide a more reliable (compared to the prior methods) assessment of the usefulness of ideas, and options of the problems solutions.

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